Informatics Competencies

for Public Health Professionals

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and the

**Public Health Informatics
Competencies Working Group**

This document is available online at www.nwcphp.org/phi/comps/.

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━ Executive Summary ━

Public health informatics has been defined as the systematic application of information and computer science and technology to public health practice, research, and learning. In recent years, a variety of training resources have been developed that address one or more aspects of informatics. However, to date these resources have been developed in relative isolation, and no consensus has been established as to specific informatics competencies that various public health professionals should have. To address this issue, the Centers for Disease Control and Prevention (CDC) initiated the formation of a working group of public health informaticians and educators (see Appendix A for a list of working group members) to draft a consensus set of public health informatics competencies. These informatics competencies are designed to complement the more general set of *Core Competencies for Public Health Professionals*, developed by the Council on Linkages Between Academia and Public Health Practice.

The Working Group developed and refined the competencies (presented in this document in Appendices B and C) during 2001-2002. The Working Group intends the competencies to be applicable to currently practicing public health professionals in the United States, though they may be applicable to public health professionals in other countries as well. Three classes of informatics competencies are defined: those related to (a) **the use of information** *per se* for public health practice; (b) **the use of information technology** to increase one's individual effectiveness as a public health professional; and (c) **the management of information technology projects** to improve the effectiveness of the public health enterprise (e.g., the state or local health department). For each competency, expertise levels are suggested for three professional workforce segments: front-line staff, senior-level technical staff, and supervisory and management staff.

The informatics competencies presented here should provide a useful starting point in the development of new learning resources for public health professionals. Proficiency in these competencies would directly assist today's public health professionals to harness the power of modern information technology to the practice of public health.

Introduction

A. Background

Information and computer science and technology are increasingly important to public health practice, research, and learning. Consequently, public health professionals at all levels should be appropriately skilled in the applications of these sciences and technologies to public health.

In recent years, a variety of training courses and other learning resources have been developed that address one or more aspects of the application of information technology to public health (CDC, 2002; Emory University, 2001; O'Carroll et al., 1998; O'Carroll et al., 2002; University of Illinois at Chicago, 2002; University of Washington, 2002). However, to date these courses and learning resources have been developed in relative isolation, and no consensus has been established as to specific informatics competencies that various public health professionals should obtain. To address this issue, a working group of public health informaticians and educators was formed (see Appendix A) to draft a consensus set of public health informatics competencies. The mission of this group was subsequently endorsed as a key component of a national agenda for public health informatics (Yasnoff et al., 2001).

At a minimum, these competencies are intended to provide a well-considered starting point for those interested in developing new informatics training resources. We hope they might also serve as a basis for the development of a general curriculum framework and, ultimately, one or more model public health informatics curricula.

B. Definitions

1. **Public Health Informatics.** We use the definition of public health informatics provided by Yasnoff et al. (2000): [Public health informatics is defined as] the systematic application of information and computer science and technology to public health practice, research, and learning.

In broad terms, today's public health professionals must be able to use *information* effectively; to use information *technology* effectively; and to manage information technology *projects* effectively. Ideally, public health leaders should also have the skill and vision to apply information science and technology to *re-engineer* certain elements of public health practice altogether, when such fundamental changes are appropriate and made feasible by modern information technology. The National Electronic Disease Surveillance System (NEDSS) project is a good example of how information technology can be applied to re-engineer a basic public health process. When completed, NEDSS will result in relatively automated public health surveillance, including the automated detection of apparent outbreaks and other anomalous disease patterns (NEDSS Working Group, 2001). All of these capacities—the use of information, the use of information technology, the

Public health informatics
The systematic application of information and computer science and technology to public health practice, research, and learning.

management of information technology projects, and the innovative application of information technology to re-engineer public health practice—may be considered elements of public health informatics.

2. **Competencies**. We define a public health informatics competency as: A public health worker's observable or measurable performance, skill, or knowledge related to the systematic application of information and computer science and technology to public health.

C. Relationship to national public health workforce development initiative, and to core public health competencies

The Working Group developed these informatics competencies within the larger context of the Global and National Implementation Plan for Public Health Workforce Development. This plan is the result of an ambitious public health workforce initiative being guided by the Public Health Workforce Development Collaborative (see www.phppo.cdc.gov/owpp/timelineComp.asp). Begun in March 1999, this initiative is being developed through a dynamic and diverse partnership of public health professionals in government, academic, and practice communities (Lichtveld et al., 2001).

These informatics competencies were designed to complement the consensus set of *Core Competencies for Public Health Professionals*, developed by the Council on Linkages Between Academia and Public Health Practice (hereafter, the Council on Linkages, or simply the Council). These core competencies, adopted by the Council in April 2001, represent ten years of work in this area by the Council along with numerous other organizations and individuals in public health academic and practice settings. For a full discussion of core competencies for public health professionals, see www.trainingfinder.org/competencies/.

━━ Developing the Competencies ━━

CDC asked the Northwest Center for Public Health Preparedness at the University of Washington (UW) School of Public Health and Community Medicine to lead a national effort to develop public health informatics competencies in the context of the Global and National Implementation Plan for Public Health Workforce Development. Dr. Patrick O'Carroll at the University of Washington and Dr. Janise Richards at CDC were appointed to lead this effort.

Drs. O'Carroll and Richards assembled a list of key public health professionals who were known to be involved in training and research in public health informatics, as well as other interested public health professionals with expertise in competency development. These individuals were invited to attend an initial meeting to launch the effort, and to discuss and provide the basic scope and framework for this project.

The initial meeting was held as a workshop on May 15, 2001, in Atlanta, Georgia, in conjunction with the 2001 Spring Congress of the American Medical Informatics Association (AMIA). More than 30 public health, informatics, and education experts met to begin to

define competencies for public health informatics. In the brief time available, the group focused on establishing the nature of the project, who it was intended to serve, and initial brainstorming to list some competencies, knowledge, skills, and abilities that might be used to develop training in public health informatics. This group agreed to serve as the core of a Working Group for the purposes of further developing the informatics competencies. (See Appendix A for a list of Working Group members.)

Working primarily through e-mail communication over the ensuing months, Drs. O'Carroll and Richards expanded the original Working Group to include new members who had an interest in the project and relevant expertise. They also developed a preliminary draft of the competencies, which was distributed to the Working Group in July 2001.

Based on feedback received through October 18, 2001, Drs. O'Carroll and Richards developed a second draft of the public health competencies document, which they sent to the Working Group at that time.

The Working Group met on October 21, 2001, in conjunction with the annual meeting of the American Public Health Association meeting in Atlanta, Georgia. At that meeting, they reviewed feedback on the first draft and discussed outstanding issues related to the second draft.

Drs. O'Carroll and Richards sent a third draft to the Working Group in June 2002, incorporating changes and a reorganization of the competencies suggested at the October 2001 meeting. After incorporating suggestions from this review by the Working Group, a final set of informatics competencies for public health professionals was delivered in August 2002 to Dr. Maureen Lichtveld, Associate Director for Workforce Development, Public Health Practice Program Office, CDC, for incorporation into the work of the Public Health Workforce Development Collaborative.

Initial Focus, Workforce Segmentation, and Assumptions

A. Initial focus

The Working Group decided that our initial focus would be on the development of informatics competencies for the *current* U.S. public health workforce. These competencies are intended to guide the development of new informatics learning resources for today's public health workforce.

However, as a group we also noted the need to articulate a detailed set of graduate-level public health informatics competencies to guide the development of training by degree-granting academic programs. Such programs are likely to develop and deliver informatics training that is both broader and deeper than is possible or appropriate for the general public health workforce. Although we do not attempt to define graduate-level public health informatics competencies in this document, such a definition remains a high priority for future work.

To a large extent, informatics competencies for the U.S. public health workforce should be applicable to the developing world as well. Established informatics principles and practices

would remain the same, although wide international disparities in hardware, software, telecommunications, applications, and data exchange standards may limit the relevance and achievability of some of the competencies. Although we have worked to develop standards that are universally useful and adaptable with regard to technology and its advances, the Working Group expects that the informatics competencies detailed in the appendices will be reviewed, modified, and adapted by many countries and interest groups.

B. Workforce segmentation

For purposes of defining specific sets of public health informatics competencies, we used the three workforce segments defined by the Council on Linkages, as follows:

1. **Front Line Staff:** Individuals who carry out the bulk of day-to-day tasks (e.g., sanitarians, counselors, nurses and other clinicians, investigators, lab technicians, health educators). Responsibilities may include basic data collection and analysis, fieldwork, program planning, outreach activities, programmatic support, and other organizational tasks.

2. **Senior Level Staff (Senior Level Technical Staff):** Individuals with a specialized staff function but not serving as managers (e.g. epidemiologists, attorneys, biostatisticians, health planners, health policy analysts). They have increased technical knowledge of principles in areas such as epidemiology, program planning and evaluation, data collection, budget development, grant writing, and so on, and may be responsible for coordination and oversight of pieces of projects or programs.

We prefer the term "Senior Level Technical Staff" to "Senior Level Staff", because we believe the former term better reflects the definition supplied by the Council on Linkages. Although we use the term "Senior Level Technical Staff" in the remainder of this document, the definition of this work force category is unchanged from that of the Council on Linkages.

3. **Supervisory and Management Staff:** Individuals responsible for major programs or functions of an organization, with staff who report to them. Increased skills can be expected in program development, program implementation, program evaluation, community relations, writing, public speaking, managing timelines and work plans, presenting arguments and recommendations on policy issues.

—*Council on Linkages. http://trainingfinder.org/competencies/background.htm*

We consider that the term *public health professionals* (a) refers *collectively* to public health workers in these three workforce segments, and (b) includes all of the public health workforce with the exception of exclusively clerical and administrative staff. Note that we explicitly include information technology professionals—e.g., computer scientists, programmers, systems analysts, database designers, and network engineers—in the *Senior Level Technical Staff* workforce segment.

Several informatics competencies apply to the *entire* public health workforce, including clerical and administrative staff. All of the informatics competencies apply in some degree to all three segments of the professional workforce. For each informatics competency in our list, we indicate the proposed level of skill (aware, knowledgeable, or proficient) for each segment of

the public health workforce. We define these skill levels in the same manner as the Council on Linkages (see www.trainingfinder.org/competencies/background.htm#definitions).

Although the three-segment workforce classification is useful in proposing varying levels of skill for each competency, it does not begin to capture the true diversity of the public health workforce (consisting as it does of nurses, physicians, environmental health specialists, epidemiologists, biostatisticians, laboratorians, managers, social workers, nutritionists, health educators, and many others). Because of the complexity of the public health workforce, our proposed levels of competency are necessarily imprecise. They should be considered simply as suggested starting points, to be adapted as appropriate to the specific training needs of a given professional in a given work setting.

Finally, we should note a special class of public health professional—the Chief Information Officer, or CIO. These persons work as policy advisors and leaders at the highest level of a public health agency, bringing special expertise in the areas of information architecture, information resource management planning, enterprise-level information systems development

Chief Information Officer
This special class of public health professionals works as policy advisors and leaders at the highest level of a public health agency, bringing special expertise in the areas of information architecture, information resource management planning, enterprise-level information systems development and integration, and organizational change management.

and integration, and organizational change management as it relates to the incorporation of information technology. Chief Information Officers are relatively new to public health. State public health agencies have only recently begun to hire CIOs, and few if any local health departments have anyone serving in such a capacity. In this document, we do not attempt to define the full set of informatics competencies for a CIO. Rather, in keeping with our focus on the current public health workforce, we defer specification of public health informatics competencies for CIO-level staff to a later time.

C. Assumptions

1. We assume that general informatics competencies (e.g., database design) are applicable to all informatics specialty areas, i.e., public health informatics, nursing informatics, clinical informatics, and any other informatics subspecialties. In addition to these general informatics competencies, there are other competencies unique to public health informatics. We have included both general and specific informatics competencies in our list.

2. We feel that some of the Council on Linkages' core competencies can properly be considered informatics competencies as well (e.g., *Evaluates the integrity and comparability of data and identifies gaps in data sources*). We have included these core competencies among our informatics competencies (the "Class 1" competencies in Appendices B and C), while acknowledging their dual role as core competencies.

3. We assume that competencies for **clinical** informatics are outside the scope of our work, although we recognize that many public health agencies deliver some clinical care. For

information related to clinical informatics competencies, we refer the reader to the International Medical Informatics Association (www.imia.org/endorsed.html); the American Medical Informatics Association (www.amia.org); and the Association of American Medical Colleges (www.aamc.org/meded/msop/).

The development of electronic repositories of clinical data in many patient care settings presents a tremendous opportunity for public health—for real-time morbidity surveillance, for the delivery of patient-specific prevention information, and for a variety of other activities at the intersection of clinical care and public health. We strongly encourage public health informaticians to engage with those developing clinical information systems, to ensure that new clinical information systems can be appropriately integrated with public health systems.

━ Conceptual Framework ━━━

We suggest three general classes of public health informatics competencies:

1. Competencies related to the **use of information** *per se* for public health practice

2. Competencies related to the **use of information technology** to increase one's *individual effectiveness* as a public health professional

3. Competencies related to the **development, deployment, and maintenance of information systems** to improve the *effectiveness of the public health enterprise* (e.g., the state or local health department)

The first class of informatics competencies has to do with the scientifically sound and ethical use, assessment, analysis, interpretation, and dissemination of data and information. As noted in the Assumptions section, we believe that these competencies are already well stated in the Council on Linkages' *Core Competencies for Public Health Professionals*, and so we have included verbatim the applicable core competencies in our list of informatics competencies. However, because training in competency areas related to data analysis and interpretation has long been an integral part of public health education—in courses in epidemiology, surveillance, biostatistics, and so forth—we do not provide example learning objectives for these competencies. To the Council on Linkages' list of core competencies, we do add a single additional Class 1 informatics competency: the systematic management of public health information as a key strategic resource of a public health organization.

Three Classes of Competencies
- Use of Information
- Use of information technology
- Development, deployment, and maintenance of Information systems

Regarding the second class of informatics competencies, related to the effective use of information technology: all public health professionals should be competent at some level in this regard, but this class of competencies is particularly important for **front-line and senior-level technical professionals** (on whom senior management officials often depend for accurate, timely, science-based information and guidance). The third class of competencies, dealing with
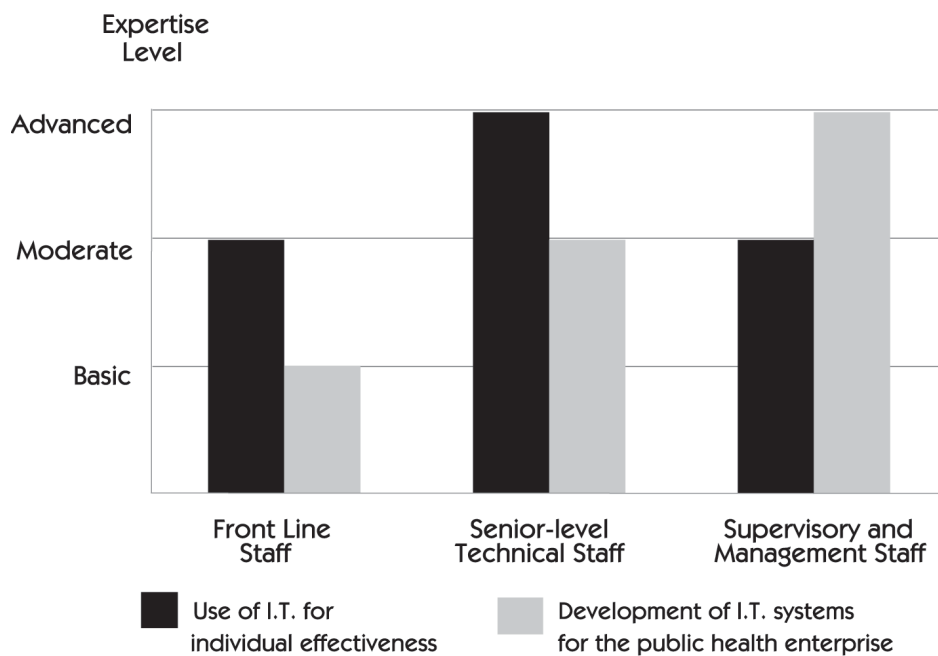
information systems development, is particularly relevant to **senior-level technical and supervisory/management staff**, who are involved in decision-making about information systems development and design, as well as in the management of information technology projects.

Within each of these latter two classes of competencies, levels of ability may be considered to vary from familiarity with basic concepts and techniques to proficiency in the application of key informatics principles and practices. For example, it may be adequate to ensure that all front-line staff are capable of basic use of the World Wide Web—opening a browser, navigating to a particular URL, and so forth—whereas for senior-level staff, we would expect a more advanced capacity to use the Web expertly, for example, to locate, assemble, evaluate, and interpret authoritative information and data relating to their particular program or organizational function (see Figure 1).

Figure 1. Levels of Expertise in Informatics by Workforce Segment and Class of Competency

Expertise
Level

Similarly, in the systems development arena (see Figure 1) we might seek to ensure that all front-line staff are aware of the important role they can play in suggesting ideas for system development, and in participating in that development. (Note that "systems development" includes contracting and purchasing of systems and system components as well as development of customized computer programs and databases.) For senior-level technical staff, we might want to ensure that they have a basic understanding of well-established processes used in information systems development (e.g., requirements specification), and understand the nature of the roles they ought to play in those processes. For supervisory and management staff, however, who make decisions about information technology projects and ultimately have management responsibility for such projects, we would expect a higher level of proficiency related to the application of systems development processes and proven techniques of information technology project management.

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Conclusion

We hope this set of informatics competencies will be useful in the development of new learning resources for public health professionals. Given the tremendous range in the size and capacity of local and state health departments, we do not expect all public health professionals to be proficient in all of these informatics competencies in all public health settings. Nevertheless, we believe that these competencies are realistic and attainable for most public health professionals in mid- to large-sized health departments. We firmly believe that proficiency in these informatics competencies would directly assist today's public health professionals to harness the power of modern information technology to the practice of public health.

Finally, in keeping with the usage of the software development world, this list of competencies may be considered a "version one" product. We expect that with experience and broader input, these competencies will be modified and improved. To provide feedback in this regard, please contact the Northwest Center for Public Health Practice at (206) 685-1130 or nwcphp@u.washington.edu, or contact Dr. O'Carroll directly at ocarroll@u.washington.edu.

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Appendix A
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Appendix B
Public Health Informatics Competencies

Class 1. Effective Use of INFORMATION

With one exception, the competencies in this Class were drawn verbatim from the "Core Competencies for Public Health Professionals" compendium developed by the *Council on Linkages Between Academia and Public Health Practice*. These core competencies may be thought of as informatics competencies as well, and thus are included here. The single additional competency in this Class is competency #24, in bold, in the Leadership and Systems Thinking domain.

Domain/	COMPETENCY
Analytic Assessment Skills	1. Determines appropriate uses and limitations of both quantitative and qualitative data 2. Evaluates the integrity and comparability of data and identifies gaps in data sources 3. Applies ethical principles to the collection, maintenance, use, and dissemination of data and information 4. Partners with communities to attach meaning to collected quantitative and qualitative data 5. Makes relevant inferences from quantitative and qualitative data 6. Obtains and interprets information regarding risks and benefits to the community 7. Applies data collection processes, information technology applications, and computer systems storage/retrieval strategies 8. Recognizes how the data illuminates ethical, political, scientific, economic, and overall public health issues
Policy Dev't/ Program Planning	9. Collects, summarizes, and interprets information relevant to an issue 10. Utilizes current techniques in decision analysis and health planning
Communication Skills	11. Communicates effectively both in writing and orally, or in other ways 12. Uses the media, advanced technologies, and community networks to communicate information 13. Effectively presents accurate demographic, statistical, programmatic, and scientific information for professional and lay audiences
Community Dimensions of Practice	14. Develops, implements, and evaluates a community public health assessment
Basic Public Health Sciences	15. Defines, assesses, and understands the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services 16. Identifies and applies basic research methods used in public health 17. Applies the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries 18. Identifies and retrieves current relevant scientific evidence 19. Identifies the limitations of research and the importance of observations and interrelationships

Domain/Topical Area	COMPETENCY
Financial Planning and Management	20. Manages information systems for collection, retrieval, and use of data for decision-making 21. Conducts cost-effectiveness, cost-benefit, and cost utility analyses
Leadership and Systems Thinking	22. Identifies internal and external issues that may impact delivery of essential public health services (i.e. strategic planning) 23. Promotes team and organizational learning 24. **Manages the information of the public health organization as a key strategic resource and mission tool**

Class 2: Effective Use of INFORMATION TECHNOLOGY

This class of competencies has to do with the ability to use various kinds of information technology to improve one's individual professional effectiveness. Certain basic competencies in this Class are relevant to all public health workers (including purely clerical and administrative staff). All of the competencies in this Class are relevant in some degree to all public health professionals.

Domain/Topical Area	COMPETENCY
Digital literacy	1. Utilizes personal computers and other office information technologies for working with documents and other computerized files
Electronic Communications	2. Utilizes modern information technology tools for the full range of electronic communication appropriate to one's duties and programmatic area
Selection and use of I.T. tools	3. Appropriately selects and utilizes state-of-the-art software tools in support of public health data acquisition, entry, management, analysis, planning, and reporting
On-line information utilization	4. Utilizes modern information technology tools to identify, locate, access, assess, and appropriately interpret and use on-line public health-related information and data
Data and System Protection	5. Utilizes information technology so as to ensure the integrity and protection of electronic files and computer systems 6. Applies all relevant procedures (policies) and technical means (security) to ensure that confidential information is appropriately protected
Distance Learning	7. Utilizes modern distance-learning technologies to support life-long learning appropriate to programmatic needs
Strategic use of I.T. to promote health	8. Utilizes modern information science and technology as a strategic tool to promote public health (e.g., through community education, behavior modification, collaborative policy development, issue advocacy and community mobilization)
Information and knowledge development	9. Combines data and information from multiple sources, to create new information to support public health decision-making

Class 3: Effective Management of INFORMATION TECHNOLOGY PROJECTS

This class of competencies has to do with the ability to effectively develop and manage information systems to improve the effectiveness of a public health enterprise. The focus here is not limited to improving one's individual professional effectiveness, although that is often a natural consequence of effective systems development. Instead, the focus is on harnessing the power of modern information technology to improve the functioning and scope of the public health agency.

Domain/ Topical Area	COMPETENCY
System development	1. Composes and manages systems development teams in a manner that demonstrates a recognition of the appropriate roles and domains for computer scientists, epidemiologists, policy makers and programmers and other IT specialists in information systems development 2. Leads and advocates for, or otherwise actively participates in, the development of integrated, cost-effective public health information systems within the public health enterprise, ensuring that new applications and information systems are built in conformance with a larger (enterprise-level) information architecture 3. Recognizes, participates in, and applies accepted models and processes for developing information systems and for managing information resources
Cross-disciplinary communication	4. Actively, effectively engages and communicates with information technology specialists as well as public health colleagues regarding proven information technologies and their potential application to public health practice
Databases	5. Participates in the development of new and enhanced databases for public health, and applies principles of good database design
Standards	6. Utilizes (or ensures the utilization of) data standards for storage and transmission, and is able to find the relevant standards specifications as needed
Confidentiality and Security Systems	7. Applies and participates in developing confidentiality and privacy policies for the enterprise, and ensures the development of adequate security systems to support the implementation of those policies
Project management	8. Utilizes proven informatics principles and practices when managing information technology projects
Human resources management	9. Utilizes proven informatics principles and practices when managing information technology staff and other IT specialists
Procurement	10. Procures appropriate cost-effective, information technologies for the public health enterprise
Accountability	11. Uses information technology to assure openness of public health agency processes and responsiveness to the electorate and the public
Research	12. Monitors informatics research findings and public health information systems development efforts, and applies these findings and experiences as appropriate to public health practice

Informatics Competencies for Public Health Professionals

Appendix C

Public Health Informatics Competencies with Suggested Proficiency Levels by Workforce Segment

In the following table, levels of proficiency (aware, knowledgeable, or proficient) are suggested for each informatics competency, for various segments of the public health workforce. *Aware* indicates a basic level of mastery of the competency, in which individuals are able to identify the concept or skill but have a relatively limited ability to perform the skill. *Knowledgeable* indicates an intermediate level of mastery of the competency, in which individuals are able to apply and describe the skill. *Proficient* indicates an advanced level of mastery of the competency, in which individuals are able to synthesize, critique, or teach the skill.

Because of the complexity of the public health workforce and the settings in which public health is practiced, our proposed levels of proficiency are necessarily imprecise. They should be considered simply as suggested starting points, to be adapted as appropriate to the specific training needs of a given professional in a given work setting.

Informatics Competencies for Public Health Professionals

Public Health Informatics Competencies

with Suggested Proficiency Levels by Workforce Segment

Class 1. Effective Use of INFORMATION

Note: With one exception, the competencies in this Class were drawn *verbatim* from the "Core Competencies for Public Health Professionals" compendium developed by the Council on Linkages Between Academia and Public Health Practice (see www.trainingfinder.org/competencies/list.htm). These core competencies may be thought of as informatics competencies as well, and thus are included here. The single additional competency in this Class is competency #24, **in bold**, in the *Leadership and Systems Thinking* domain.

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS		
		Front Line Staff	**Senior-Level Technical Staff**	**Supervisory & Management**
Analytic Assessment Skills	1. Determines appropriate uses and limitations of both quantitative and qualitative data	Aware to knowledgeable	Proficient	Proficient
	2. Evaluates the integrity and comparability of data and identifies gaps in data sources	Aware	Proficient	Proficient
	3. Applies ethical principles to the collection, maintenance, use, and dissemination of data and information	Knowledgeable to proficient	Proficient	Proficient
	4. Partners with communities to attach meaning to collected quantitative and qualitative data	Aware to knowledgeable	Proficient	Proficient
	5. Makes relevant inferences from quantitative and qualitative data	Aware to knowledgeable	Proficient	Proficient
	6. Obtains and interprets information regarding risks and benefits to the community	Aware to knowledgeable	Proficient	Proficient
	7. Applies data collection processes, information technology applications, and computer systems storage/retrieval strategies	Aware to knowledgeable	Knowledgeable to proficient	Knowledgeable to proficient
	8. Recognizes how the data illuminates ethical, political, scientific, economic, and overall public health issues	Aware	Knowledgeable to proficient	Proficient

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS		
		Front Line Staff	Senior-Level Technical Staff	Supervisory & Management
Policy Dev't/ Program Planning	9. Collects, summarizes, and interprets information relevant to an issue	Knowledgeable	Proficient	Proficient
	10. Utilizes current techniques in decision analysis and health planning	Aware	Knowledgeable to proficient	Proficient
Communication Skills	11. Communicates effectively both in writing and orally, or in other ways	Proficient	Proficient	Proficient
	12. Uses the media, advanced technologies, and community networks to communicate information	Aware to knowledgeable	Proficient	Proficient
	13. Effectively presents accurate demographic, statistical, programmatic, and scientific information for professional and lay audiences	Knowledgeable	Proficient	Proficient
Community Dimensions of Practice	14. Develops, implements, and evaluates a community public health assessment	Knowledgeable	Proficient	Proficient
Basic Public Health Sciences	15. Defines, assesses, and understands the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services	Knowledgeable	Proficient	Proficient
	16. Identifies and applies basic research methods used in public health	Aware	Proficient	Proficient
	17. Applies the basic public health sciences including behavioral and social sciences, biostatistics, epidemiology, environmental public health, and prevention of chronic and infectious diseases and injuries	Knowledgeable	Proficient	Proficient
	18. Identifies and retrieves current relevant scientific evidence	Knowledgeable	Proficient	Proficient
	19. Identifies the limitations of research and the importance of observations and interrelationships	Knowledgeable	Proficient	Proficient

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS		
		Front Line Staff	Senior-Level Technical Staff	Supervisory & Management
Financial Planning and Management	20. Manages information systems for collection, retrieval, and use of data for decision-making	Aware	Knowledgeable to proficient	Proficient
	21. Conducts cost-effectiveness, cost-benefit, and cost utility analyses	Aware	Knowledgeable	Proficient
Leadership and Systems Thinking	22. Identifies internal and external issues that may impact delivery of essential public health services (i.e. strategic planning)	Aware	Knowledgeable to proficient	Proficient
	23. Promotes team and organizational learning	Knowledgeable	Knowledgeable to proficient	Proficient
	24. **Manages the information of the public health organization as a key strategic resource and mission tool**	Knowledgeable	Proficient	Proficient

Public Health Informatics Competencies

This class of competencies has to do with the ability to use various kinds of information technology to improve one's individual professional effectiveness. Certain basic competencies in this Class are relevant to all public health workers (including purely clerical and administrative staff). All of the competencies in this Class are relevant in some degree to all public health professionals.

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS				Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
		Clerical/ Admin	Front Line Staff	Senior-Level Technical	Supervisory & Management		
Digital literacy	1. Utilizes personal computers and other office information technologies for working with documents and other computerized files	Proficient	Proficient	Proficient	Proficient	• recognize and understand the function of the main components of a computer • launch a computer application • save work to a computer file, and locate and open a file on a computer disk drive • print a file • copy a file for use on another computer • use a standard word processing program to create and edit a formatted document using tables and graphics • use a fax machine to send a facsimile copy of a document	• All (indirectly)
Electronic Communications	2. Utilizes modern information technology tools for the full range of electronic communication appropriate to one's duties and programmatic area.	Knowledgeable	Proficient	Proficient	Proficient	• send and receive e-mail (using appropriate e-mail etiquette) • open and save binary attachments to e-mail messages, and attach files to outgoing e-mail messages • collaborate electronically with peers, e.g., by identifying, subscribing to, and participating in program-appropriate electronic "lists" (e-mail-based discussion groups) or other collaborative applications • send health alerts to pre-established groups using e-mail, broadcast fax, and other appropriate technologies	• All (indirectly) *but especially:* • Communication • Cultural Competency • Community Dimensions of Practice • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
Selection and use of I.T. tools	3. Appropriately selects and utilizes state-of-the-art software tools in support of public health data acquisition, entry, management, analysis, planning, and reporting.	n/a	Aware	Proficient	Knowledgeable	• describe the process of locating, assessing, and comparing available software tools for a particular function • apply knowledge of the public health workforce and system capacity to select the most appropriate software tools. • effectively use software tools appropriate to one's position, including (for example) electronic spreadsheets, database applications, and presentation software. • describe the common applications of statistical software to public health practice, and demonstrate at least basic familiarity with one or more statistical software packages. • describe the utility of GIS to public health data analysis and display, and demonstrate at least basic familiarity with at least one GIS software system.	• All (indirectly) *but especially:* • Analytic/Assessment • Communication • Basic PH Sciences • Financial Planning and Management
On-line information utilization	4. Utilizes modern information technology tools to identify, locate, access, assess, and appropriately interpret and use on-line public health-related information and data.	Knowledgeable	Knowledgeable to Proficient	Proficient	Knowledgeable to Proficient	• use browser software to navigate the World-Wide Web • use general-purpose on-line search engines to search the Web • identify special-purpose search engines (e.g., *PubMed, CDC WONDER*) relevant to their specific program, and use those search engines to retrieve public health-specific information and data • assess the validity, authoritativeness, and appropriate uses of data and information retrieved from on-line sources	• Analytic/ Assessment • Policy Dev't/ Program Planning • Cultural Competency • Basic PH Sciences • Financial Planning and Management • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS				Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
		Clerical/ Admin	Front Line Staff	Senior-Level Technical	Supervisory & Management		
Data and System Protection	5. Utilizes information technology so as to ensure the integrity and protection of electronic files and computer systems	Knowledgeable	Knowledgeable to Proficient	Proficient	Knowledgeable to Proficient	• appropriately use and maintain virus-scanning software installed at their organization • make timely and appropriate back-ups of important electronic files • use data verification and validation procedures as necessary when doing data entry/editing • describe the relevant policies and procedures needed for recovery in case of an IT-related disaster • describe the proper use, testing, and maintenance of backup servers, power sources, and communications facilities and the rationale behind these procedures • describe the procedures for assuring that the information entered or displayed on a web site is secure (e.g. use and recognition of secure web sites, browser configuration for adequate encryption)	• All (indirectly)
	6. Applies all relevant procedures (policies) and technical means (security) to ensure that confidential information is appropriately protected.	Aware	Knowledgeable	Proficient	Proficient	• describe the confidentiality policies associated with each data source for which the user has access • explain the officially approved (i.e. departmental) procedures for assuring that the confidentiality of restricted information resources is not breached • use security tools and procedures appropriately and effectively to protect access to restricted information (e.g., adequate length, non-dictionary, non-proper-name passwords and other authentication methods)	• All (indirectly) *but especially:* • Analytic/Assessment • Policy Development/ Program Planning • Communication • Cultural Competency • Basic PH Sciences • Financial Planning and Management • Leadership and Systems Thinking
Distance Learning	7. Utilizes modern distance-learning technologies to support life-long learning appropriate to programmatic needs	Aware	Knowledgeable to Proficient	Knowledgeable to Proficient	Knowledgeable to Proficient	• discover available on-line learning opportunities • identify the public health distance learning coordinator for their state • find, register for, and participate in both synchronous and asynchronous Internet-based learning opportunities • participate in satellite broadcast-based learning at or near their work-site	• All (indirectly)

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
Strategic use of I.T. to promote health.	8. Utilizes modern information science and technology as a strategic tool to promote public health (e.g., through community education, behavior modification, collaborative policy development, issue advocacy and community mobilization).	n/a	Aware	Proficient	Proficient	• design and deploy an agency/organization Web site that helps users find health-related information (e.g., disease/injury prevention recommendations, vaccination schedules, community health statistics, etc.). • develop strategies to design and target prevention messages to specific populations. • employ information technologies (e.g., e-mail, Web, listservs) to broadcast health-related news, alerts, and advisories to community members, legislators and other policy makers, news media, and others. • employ collaborative information technologies to broaden input into the policy-making process (e.g., e-mail discussion lists among public health leaders, and web-based input from community members on pending policy decisions) • recognize opportunities to apply or develop new information systems in support of public health	• Policy Development/ Program Planning • Communication • Cultural Competency • Community Dimensions of Practice • Financial Planning and Management • Leadership and Systems Thinking
Information and knowledge development	9. Combines data and information from multiple sources, to create new information to support public health decision-making	n/a	Aware	Proficient	Knowledgeable	• identify the wide array of information sources that are potentially relevant to public health (e.g., clinical, labor, police and criminal justice, environmental, and social services data) • find on-line data and information from multiple sources • appropriately combine, interpret, and utilize data and information from multiple sources to create new information and knowledge	• Analytic/Assessment • Policy Development/ Program Planning • Basic PH Sciences

Public Health Informatics Competencies

This class of competencies has to do with the ability to effectively develop and manage information systems to improve the effectiveness of a public health enterprise. The focus here is not limited to improving one's individual professional effectiveness, although that is often a natural consequence of effective systems development. Instead, the focus is on harnessing the power of modern information technology to improve the functioning and scope of the public health agency.

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
System development	1. Composes and manages systems development teams in a manner that demonstrates a recognition of the appropriate roles and domains for computer scientists, epidemiologists, policy makers and programmers and other IT specialists in information systems development	n/a	Knowledgeable	Proficient	Proficient	• describe the function of each of the disciplines in a multidisciplinary project team developing a public health information system • explain the critical importance of using interdisciplinary teams to develop I.T. projects, and of ensuring good communications between technical and program staff • explain the training and experience expected of persons from each of the domains • effectively assemble and lead a multidisciplinary team of professionals to build public health information systems	• Financial Planning and Management • Leadership and Systems Thinking
	2. Leads and advocates for, or otherwise actively participates in, the development of integrated, cost-effective public health information systems within the public health enterprise, ensuring that new applications and information systems are built in conformance with a larger (enterprise-level) information architecture.	n/a	Aware	Knowledgeable	Proficient	• recognize and explain the costs and benefits of information systems • describe the elements of information architecture • explain the value of an information architecture to the public health enterprise • describe, develop and implement a process by which an organization develops a coherent information architecture • describe proven organizational models for effective management of I.T. projects	• Communication • Financial Planning and Management • Leadership and Systems Thinking

| Domain/ Topical Area | COMPETENCY | PUBLIC HEALTH PROFESSIONALS | | | | Example Learning Objectives (person will be able to…) | Related Council on Linkages' Core Competencies |
		Clerical/ Admin	Front Line Staff	Senior-Level Technical	Supervisory & Management		
	3. Recognizes, participates in, and applies accepted models and processes for developing information systems and for managing information resources	n/a	Aware	Knowledgeable	Proficient	• describe the nature of requirements specification, and explain its importance in systems development • manage a requirements specification process, ensuring that all appropriate stakeholders are actively involved throughout the process • define the role of functional decomposition as it relates to building business models; explain how these models relate to building information systems specifically and to information resource management planning generally • understand the importance of applying standard elements (e.g., broadly accepted users interfaces, communications protocols, data formats, etc.) whenever possible in system development • list examples when expertise from other disciplines (e.g., systems analysis, or database design) is needed in the development process • promote the use of widely accepted tools (such as rapid prototyping) for requirements specification and development • manage the informed development of business, information, and information technology models in support of information resource management planning	• Financial Planning and Management • Leadership and Systems Thinking

| Domain/ Topical Area | COMPETENCY | PUBLIC HEALTH PROFESSIONALS | | | | Example Learning Objectives (person will be able to…) | Related Council on Linkages' Core Competencies |
		Clerical/ Admin	Front Line Staff	Senior-Level Technical	Supervisory & Management		
Cross-disciplinary communication	4. Actively, effectively engages and communicates with information technology specialists as well as public health colleagues regarding proven information technologies and their potential application to public health practice.	Aware	Knowledgeable	Proficient	Proficient	• describe at a basic level the fundamentals of computer networking, including the cost and support implications of various networking solutions • describe at a basic level the essential underpinnings of the Internet and the World Wide Web • describe at a basic level common technologies employed to ensure computer systems' security, and the meaning of the terms authentication, encryption, non-repudiation, and other concepts basic to computer security • describe nascent information technologies (e.g., personal digital assistants and wireless networking), and how they might be employed to improve public health practice. • name the main technologies currently available for delivering high-bandwidth distance learning materials to the learner, and describe the relative advantages and (local) feasibility of each.	• Communication • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
Databases	5. Participates in the development of new and enhanced databases for public health, and applies principles of good database design	n/a	Knowledgeable	Proficient	Knowledgeable to Proficient	• explain the basics of commonly employed database management systems, and define common relational database concepts such as entity, relationship, instance, attribute, domain, and normalization • understand the nature and purpose of good database design, and how to participate in that design process • describe the concept and characteristics of a correct and complete data model • interpret entity-relationship diagrams • define appropriate roles for those involved in database design and development, including the public health scientist and other subject matter experts; systems analyst; programmer; database administrator; project manager; et al.	• Analytic/Assessment • Communication • Financial Planning and Management • Leadership and Systems Thinking
Standards	6. Utilizes (or ensures the utilization of) data standards for storage and transmission, and is able to find the relevant standards specifications as needed.	n/a	Aware	Proficient	Knowledgeable to Proficient	• describe the basic purposes of public health-relevant communications standards (e.g., HL-7) and data standards (e.g., LOINC and SNOMED) • explain the importance of the use of controlled vocabulary • explain how utilization of such standards contributes to effective information systems development and integration	• Policy Development/ Program Planning • Communication • Financial Planning and Management • Leadership and Systems Thinking
Confidentiality and Security Systems	7. Applies and participates in developing confidentiality and privacy policies for the enterprise, and ensures the development of adequate security systems to support the implementation of those policies.	n/a	Aware	Knowledgeable	Proficient	• describe the relationship between confidentiality/privacy policies and computer security • define a security system, including both technological and non-technological components • list and explain the principles of Fair Information Practices • describe HIPAA and its likely impact on the public health enterprise	• Policy Development/ Program Planning • Communication • Cultural Competency • Community Dimensions of Practice • Basic PH Sciences • Financial Planning and Management • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
Project management	8. Utilizes proven informatics principles and practices when managing information technology projects	n/a	Aware	Knowledgeable	Proficient	• define the array of different kinds of expertise needed for various information systems development projects • describe the importance of *teams* to information system development, and how to manage teams of people with diverse skill sets and professional cultures • describe strategies to ensure that end users are consistently involved in systems development from beginning to end • describe techniques for managing expectations systematically throughout system development • describe methods used to "over-communicate" progress among staff, potential users, and other stakeholders to secure and maintain support for the project • describe how to select proven technologies, and explain the importance of avoiding proprietary solutions • explain mechanisms to build in the potential for evaluation of the impact of new information technologies • list techniques to increase institutional use of information systems, such as training, incentives, communication, and behavior modification • insist on demonstrations of progress, and clear documentation of code	• Policy Development/ Program Planning • Communication • Financial Planning and Management • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	PUBLIC HEALTH PROFESSIONALS				Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
		Clerical/ Admin	Front Line Staff	Senior-Level Technical	Supervisory & Management		
Human resources management	9. Utilizes proven informatics principles and practices when managing information technology staff and other IT specialists.	n/a	Aware	Knowledgeable	Proficient	• explain strategies to hire staff with appropriate skills for appropriate tasks (e.g., "look for proven expertise") • describe strategies for ensuring adequate I.T. support given the difficulty in providing market-level compensation in the public health sector • describe when and how to engage consultants in systems development • ensure that technical staff explain issues in terms comprehensible by non-technologists • handle "technical obfuscation" constructively • plan for loss (to outside market) of technically competent staff	• Communication • Cultural Competency • Financial Planning and Management • Leadership and Systems Thinking
Procurement	10. Procures appropriate cost-effective information technologies for the public health enterprise	n/a	Aware	Knowledgeable	Proficient	• describe methods for locating available products and vendors in a specific IT area • describe steps in assessing "build vs. buy" options • make rational assessments of and decisions about procurement of modern information technologies • phase large procurements in a manner that allows for "early warning signs" of potential problems. • describe the costs and benefits of information systems and the approaches to determining them • explain how strategic resource allocation decisions should be approached and resolved	• Financial Planning and Management
Accountability	11. Uses information technology to assure openness of public health agency processes and responsiveness to the electorate and the public	n/a	Aware	Proficient	Knowledgeable to Proficient	• use the Web and other information technologies to interactively communicate agency policies, invite public comment, share information about agency actions in the community, and so forth.	• Communication • Cultural Competency • Community Dimensions of Practice • Financial Planning and Management • Leadership and Systems Thinking

Domain/ Topical Area	COMPETENCY	Clerical/ Admin	PUBLIC HEALTH PROFESSIONALS			Example Learning Objectives (person will be able to…)	Related Council on Linkages' Core Competencies
			Front Line Staff	Senior-Level Technical	Supervisory & Management		
Research	12. Monitors informatics research findings and public health information systems development efforts, and applies these findings and experiences as appropriate to public health practice.	n/a	Aware	Proficient	Proficient	• identify the major information systems development efforts currently under way that are likely to impact public health practice • discuss how certain leading-edge technologies (such as hand-held computers [PDAs], wireless networking, automated environmental sensors, software agents, et al.) might be applied to support public health field work • regularly scan/periodically review appropriate scientific and practice literature for IT developments and applications to public health	• Analytic/Assessment • Policy Development/ Program Planning • Leadership and Systems Thinking

Notes