

INFORMATICS COMPETENCIES

FOR PUBLIC HEALTH PROFESSIONALS

Draft 2

This document is a work in progress.

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INTRODUCTION

A. BACKGROUND

Information and computer science and technology is 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. However, to date these courses and learning resources have been developed in relative isolation, and no consensus has been heretofore established as to specific informatics competencies that various public health professionals should have. To address this issue, a working group of public health informaticians and educators was formed to draft a consensus set of public health informatics competencies. At a minimum, such competencies could provide a well-considered starting point for those interested in developing new informatics training resources. Hopefully, 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 reporting anomalies. All of these capacities—the use of information, the use of information technology, the 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.** By competencies, we mean applied skills and knowledge (blended with behaviors) that enable people to perform work.* The term “competency” has been defined as:

- a complex combination of knowledge, skills and abilities demonstrated by organization members that are critical to the effective and efficient function of the organization (Center for Public Health Practice, Emory University); and
- a combination of observable and measurable skills, knowledge, performance, behavior and personal attributes that contribute to enhanced employee performance and organizational success (American Compensation Association).

Applying these concepts to our purposes, we define a public health informatics competency as:

observable or measurable performance, skill or knowledge by a public health worker related to the 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

These informatics competencies were developed 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 <http://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 <http://www.trainingfinder.org/competencies/>

* Adapted from the “Competency to Curriculum Toolkit”, currently being developed as part of the national public health workforce development initiative.

PROCESS FOR DEVELOPING PUBLIC HEALTH INFORMATICS COMPETENCIES

This set of public health informatics competencies was developed as follows::

- 1) The Center for Public Health Preparedness at the University of Washington (UW) School of Public Health and Community Medicine was asked by CDC 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 UW and Dr. Janise Richards at CDC were tasked to lead this effort.
- 2) Drs. O'Carroll and Richards assembled a list of key public health professionals who were known to be involved in training and/or 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 this effort, and to discuss and provide the basic scope and framework for this project.
- 3) This 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 health, informatics, and education experts met to begin to define competencies for public health informatics (see Appendix A). 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 an ongoing Working Group for the purposes of developing the informatics competencies.
- 4) E-mail communication was established with this list of attendees plus others recommended by attendees and other consultants over the ensuing months. A first draft of the competencies was distributed to the group in July 2001. The original Working Group was expanded to include several new members who had interest and relevant expertise.
- 5) A second draft of the public health competencies document was developed based on feedback received through October 18, 2001. This second draft was sent to members of the Working Group at that time.
- 6) A meeting of the Working Group was held on October 21, 2001, in conjunction with the annual meeting of the American Public Health Association meeting in Atlanta, Georgia. At that meeting, feedback on the first draft was reviewed and outstanding issues related to the second draft were discussed.
- 7) [FINAL STEP: A {second? third?} draft was sent to wider audience, and a comment period of _____ was established. Final input during this period {will be} incorporated into the final draft. This final draft {will be} delivered to Dr. Lichtveld at the Office of Workforce Policy & Planning, 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 *existing* U.S. public health workforce. We hope that these competencies can guide the development of new informatics learning resources for today's public health workforce.

However, as a group we also noted the pressing need to establish graduate-level competencies to guide the development of academic programs and courses in public health informatics. Although we do not attempt to define graduate level public health informatics competencies in this document, this remains a high priority for future work.

Informatics competencies for the U.S. public health workforce are likely to be substantially different than a similar set of competencies articulated for the developing world. Although established informatics principles and practices would remain the same, the constrained access to information technologies still common in much of the developing world would likely necessitate a different, perhaps narrower set of informatics competencies. A possible focus for future work would be to adapt the competencies presented here for use in the developing world.

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, etc. and may be responsible for coordination and/or oversight of pieces of projects or programs.

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.

from <http://trainingfinder.org/competencies/background.htm>

We consider the term *public health professionals* to (a) refer collectively to public health workers in these three workforce segments, and (b) include all of the public health workforce with the exception of exclusively clerical and administrative staff.

Particular informatics competencies may apply to the entire public health workforce (including clerical and administrative staff); all public health professionals; two of the three professional workforce segments; or only a single professional workforce segment. In our list of informatics competencies (below), we indicate which competencies are relevant to what component(s) of the public health workforce. Most of the competencies apply to public health professionals of one sort or another, but a few apply to the entire public health workforce.

We explicitly include information technology professionals, e.g., computer scientists, programmers, systems analysts, database designers, network technicians, and so forth, in the *Senior Level Technical Staff* workforce segment.

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 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

† 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 workforce category is unchanged from that of the Council on Linkages.

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 (as we likewise defer specification of competencies for graduate level training in public health informatics).

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 additional 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, 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 (<http://www.imia.org/endorsed.html>); the American Medical Informatics Association (www.amia.org); and the Association of American Medical Colleges (<http://www.aamc.org/meded/msop/informat.htm>).

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 as soon as possible, to ensure that new clinical information systems can be appropriately integrated with public health systems.

CONCEPTUAL FRAMEWORK

We suggest that there are two general classes of public health informatics competencies:

- (1) competencies related to the *use of information and computer science and technology to increase one's individual effectiveness as a public health professional*, and
- (2) competencies related to the *development, deployment, and maintenance of information systems to improve the effectiveness of the public health enterprise* (e.g., the local health department).

All public health professionals should be competent at some level in the first class, 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 second class of competencies 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 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 to (for example) locate, assemble, evaluate and interpret authoritative information and data relating to their particular program or organizational function. (see Figure 1).

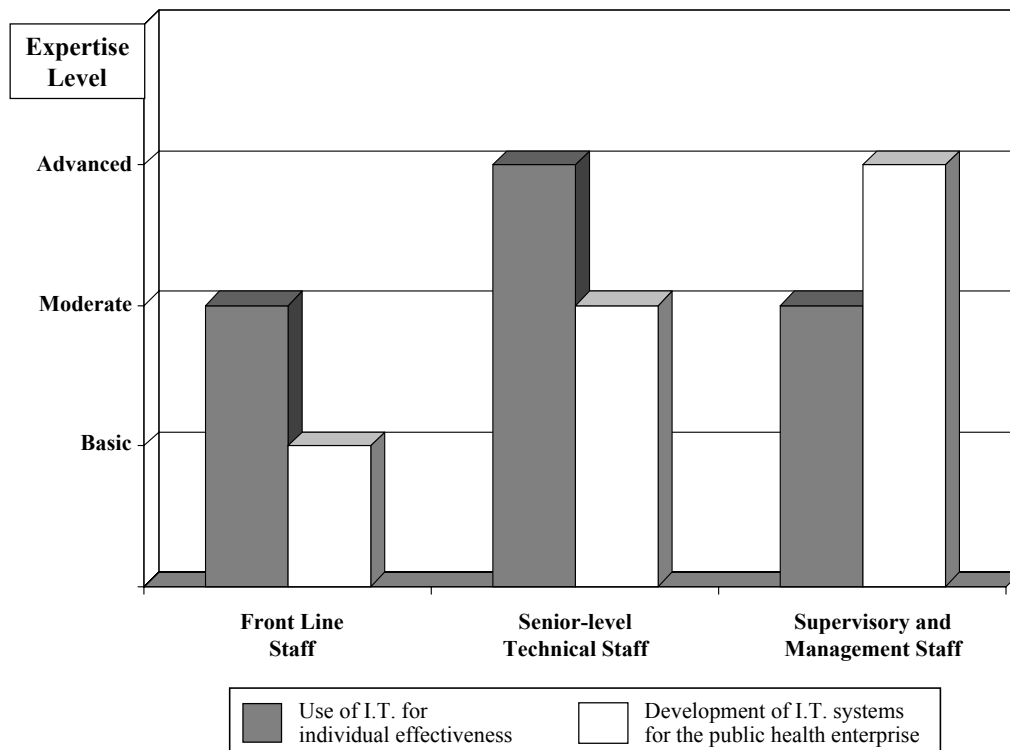


Figure 1. Levels of Expertise in Informatics by Workforce Segment and Class of Competency

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. 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.

Some public health informaticians believe there is a third class of informatics competencies, related to the use of information *per se* (as opposed to the use of information technology) for public health. These competencies relate to the scientifically sound and ethical use, assessment, analysis, and interpretation of data and information. As noted above (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 those core competencies as a third class 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 specify separate learning objectives for these competencies.

PUBLIC HEALTH INFORMATICS COMPETENCIES

[INSERT COMPETENCIES TABLE HERE from the accompanying worksheet]

REFERENCES

- Lichtveld MY, Cioffi JP, Baker EL, Bailey SB, Gebbie K, Henderson JV, Jones DL, Kurz RS, Margolis S, Miner K, Thielen L, Tilson H. Partnership for Front-Line Success: A Call for a National Action Agenda on Workforce Development. *J Public Health Management Practice* 2001;7(4):1-9.
- Yasnoff WA, O'Carroll PW, Koo D, Linkins RW, Kilbourne E. Public Health Informatics: Improving and transforming public health in the information age. *Journal of Public Health Management and Practice* 2000;6(6):67-75.

APPENDIX A. MEMBERS OF THE PUBLIC HEALTH INFORMATICS COMPETENCIES
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