

# INFORMATICS COMPETENCIES

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FOR PUBLIC HEALTH PROFESSIONALS

## Draft 1

**This document is a work in progress.**

Please send all comments, suggestions and questions  
to Dr. Patrick O'Carroll, at [ocarroll@u.washington.edu](mailto:ocarroll@u.washington.edu)

# INFORMATICS COMPETENCIES

## FOR PUBLIC HEALTH PROFESSIONALS

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### INTRODUCTION

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#### 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 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.\* A “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 skill, 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 of a public health worker related to the application of information and computer science and technology to public health practice.*

#### C. RELATIONSHIP TO NATIONAL PUBLIC HEALTH WORKFORCE DEVELOPMENT INITIATIVE, AND TO CORE PUBLIC HEALTH COMPETENCIES

We are developing 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 involving a diverse partnership of public health professionals in government, academic, and practice communities (Lichtveld et al., 2001).

We are designing these informatics competencies 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). These core competencies, adopted by the Council on April 11, 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/>

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### PROCESS FOR DEVELOPING PUBLIC HEALTH INFORMATICS COMPETENCIES

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We developed this set of public health informatics competencies as follows::

- 1) The Center for Public Health Preparedness at UW SPHCM 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

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

Workforce Development. Dr. Patrick O'Carroll at UW and Dr. Janise Richards at CDC 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, immediately preceding the 2001 Spring Congress of the American Medical Informatics Association (AMIA). More than 30 health and informatics experts met to begin to define core 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 initial competencies, knowledge, skills, and abilities that might be used to develop training in public health informatics.
- 4) E-mail communication was established with this list of attendees, plus others recommended by attendees or others, over the ensuing months. A first draft of the competencies was distributed to the group in July 2000.
- 5) Progress toward the development of these competencies [is to be] presented at the Public Health Workforce Development Annual Meeting, 9/12-13, 2001. [opportunities for feedback at that meeting will be sought]
- 6) [describe the rest of the process as it ultimately unfolds...]

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## INITIAL FOCUS, WORKFORCE SEGMENTATION, AND ASSUMPTIONS

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### A. INITIAL FOCUS

We decided that our initial focus would be on the development of informatics competencies for the *existing* 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 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.

### 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 that the term *public health professionals* (a) refers to public health workers in these three workforce segments collectively, and (b) includes all of the public health workforce with the exception of purely clerical and administrative staff.

Particular informatics competencies may apply to the entire public 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 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

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† 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.

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 (as we likewise defer specification of competencies for graduate level training in public health informatics). **[REVIEWERS: Is there too much/too little information about CIOs here?]**

### 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 aspect 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 are involved in clinical care. For information related to clinical informatics competencies, we refer the reader to work by the International Medical Informatics Association (<http://www.imia.org/endorsed.html>); the Association of American Medical Colleges (<http://www.aamc.org/meded/msop/informat.htm>), and the American Medical Informatics Association ([www.amia.org](http://www.amia.org)).

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## CONCEPTUAL FRAMEWORK

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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 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 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 the 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, and appropriately utilize authoritative information and data relating to their particular program or organizational function. (see Figure 1).

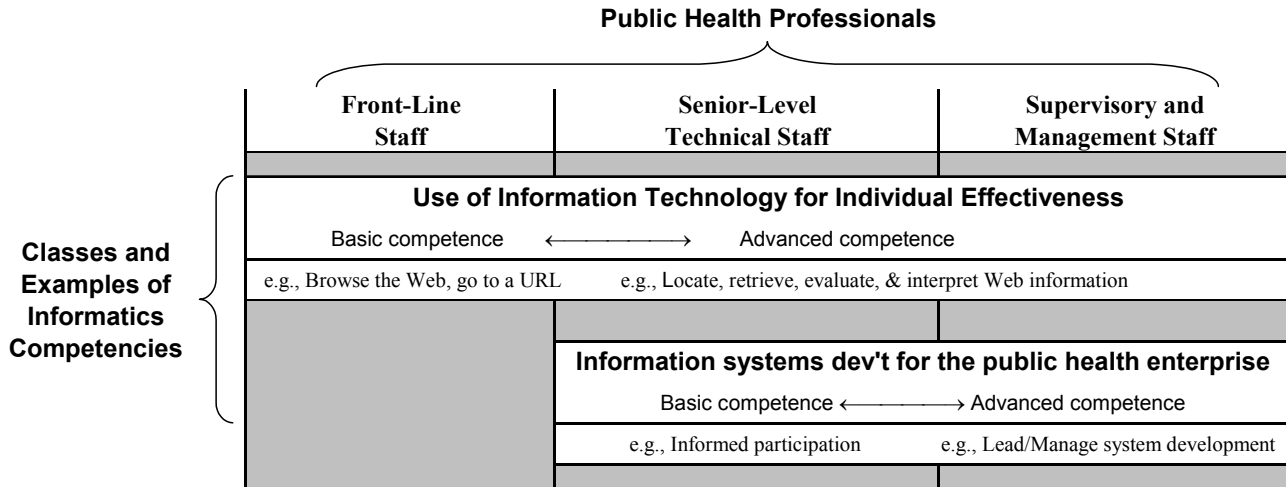


Figure 1. Classes of informatics competencies by public health professional workforce segments.

Similarly, in the systems development arena (see Figure 1) we might seek to ensure that all senior-level staff are aware 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 might 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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**PUBLIC HEALTH INFORMATICS COMPETENCIES**

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[INSERT COMPETENCIES HERE from the accompanying worksheet: **competencies.xls**.]

#### D. REFERENCES

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- 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 WORKING GROUP.

<i>Name</i>	<i>E-mail address</i>	<i>Affiliation</i>	<i>Phone Number</i>
Alexander, Lorraine	<a href="mailto:Lorraine_Alexander@unc.edu">Lorraine_Alexander@unc.edu</a>	U. North Carolina SPH (CPHP)	919-966-7423
Allee, Nancy	<a href="mailto:nallee@umich.edu">nallee@umich.edu</a>	U. Michigan SPH	734-763-5678
Bialek, Don	<a href="mailto:dbialek@hsph.harvard.edu">dbialek@hsph.harvard.edu</a>	Harvard SPH	207-847-9209
Corn, Milt	<a href="mailto:cornM@mail.nlm.nih.gov">cornM@mail.nlm.nih.gov</a>	National Library of Medicine	301-496-4621
Dato, Virginia	<a href="mailto:vmdato@vms.cis.pitt.edu">vmdato@vms.cis.pitt.edu</a>	U. Pittsburgh	412-383-7280
Davies, Jac	<a href="mailto:jac.davies@doh.wa.gov">jac.davies@doh.wa.gov</a>	Washington State Health Dept	(206)361-4883 (Seattle)
Drehobl, Patricia	<a href="mailto:pdb2@cdc.gov">pdb2@cdc.gov</a>	CDC	(360)236-4204 (Olympia)
Fuller, Sherrilynne	<a href="mailto:sfuller@u.washington.edu">sfuller@u.washington.edu</a>	UW Health Sciences Libraries	404-639-3707
Gamache, Roland	<a href="mailto:rgamache@isdh.state.in.us">rgamache@isdh.state.in.us</a>	Indiana Health Dept	206-616-5808
Gassert, Carol	<a href="mailto:CGassert@hrsa.gov">CGassert@hrsa.gov</a>	HRSA	301-443-1272
Hann, Neil	<a href="mailto:neil@health.state.ok.us">neil@health.state.ok.us</a>	RWJ IT Collaborator	405-271-5601
Hase, Denise	<a href="mailto:deniseh@nchd.org">deniseh@nchd.org</a>	NE CO Health Dept.	970-522-3741 x120
Humphreys, Betsy	<a href="mailto:humphreb@mail.nlm.nih.gov">humphreb@mail.nlm.nih.gov</a>	National Library of Medicine	301-496-6921
Karras, Bryant	<a href="mailto:bryantK@u.washington.edu">bryantK@u.washington.edu</a>	U. Washington SPHCM	206-221-6676
Knudson-Buresh, Alana	<a href="mailto:aknudson-buresh@astho.org">aknudson-buresh@astho.org</a>	ASTHO	202-371-9090 x237
Koo, Denise	<a href="mailto:DKoo@cdc.gov">DKoo@cdc.gov</a>	CDC	404-639-3077
Kukafka, Rita	<a href="mailto:rk326@columbia.edu">rk326@columbia.edu</a>	Columbia SPH	
Lichtveld, Maureen	<a href="mailto:MLichtveld@cdc.gov">MLichtveld@cdc.gov</a>	CDC	770-488-8471
Lloyd, Doug	<a href="mailto:dsl@asph.org">dsl@asph.org</a>	ASPH	202-296-1099
O'Carroll, Patrick	<a href="mailto:ocarroll@u.washington.edu">ocarroll@u.washington.edu</a>	CDC	206-616-9460
Oberle, Mark	<a href="mailto:moberle@u.washington.edu">moberle@u.washington.edu</a>	U. Washington SPHCM (CPHP)	206-543-1144
Matiella, Charles E.	<a href="mailto:cmatiella@NACCHO.org">cmatiella@NACCHO.org</a>	NACCHO	202-783-5550
Maxymiv, Kristine	<a href="mailto:kmaxymiv@astho.org">kmaxymiv@astho.org</a>	ASTHO	202-371-9090
Mensah, Ed	<a href="mailto:dchasnem@uic.edu">dchasnem@uic.edu</a>	U. Illinois-Chicago SPH (CPHP)	312-996-3001
Merrill, Jacqueline	<a href="mailto:jam119@columbia.edu">jam119@columbia.edu</a>	Columbia SPH	212 305-3659
Miner, Kathy	<a href="mailto:kminer@sph.emory.edu">kminer@sph.emory.edu</a>	Emory Rollins SPH	404-727-8745
Morse, Steve	<a href="mailto:ssm20@columbia.edu">ssm20@columbia.edu</a>	Columbia SPH (CPHP)	212-305-8054
Neuberger, Babette	<a href="mailto:bjn@uic.edu">bjn@uic.edu</a>	U. Illinois Chicago - SPH	
Rambo, Neil	<a href="mailto:nrambo@u.washington.edu">nrambo@u.washington.edu</a>	U. Washington SPHCM	206-543-8262
Richards, Janise	<a href="mailto:jrichards@cdc.gov">jrichards@cdc.gov</a>	CDC	770-488-2433
Ross, Dave	<a href="mailto:dross@taskforce.org">dross@taskforce.org</a>	All Kids Count	404-687-5634
Stover-Hertzberg, Vicki	<a href="mailto:vhertz@sph.emory.edu">vhertz@sph.emory.edu</a>	Emory Rollins SPH	404-727-1881
Williamson, G. David	<a href="mailto:gwilliamson@cdc.gov">gwilliamson@cdc.gov</a>	CDC	770-488-8188
Yasnoff, Bill	<a href="mailto:wyasnoff@cdc.gov">wyasnoff@cdc.gov</a>	CDC	770-488-2503