Informatics Competencies

for Public Health Professionals

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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		
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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

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	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		
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

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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)

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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

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.

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			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

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			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

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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

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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

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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

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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

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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