
Information Architecture

Key Points

- With increasing amounts of data coming to public health agencies (PHAs) electronically because of Meaningful Use and other factors, pressure will build within PHAs to critically re-think how they receive, store, use, and visualize information to support programmatic goals and agency missions.
- Greater interoperability, and simply *more* data, will require PHAs to consider the structure and coherence of its data stores, and the ways in which data is conceptualized, stored, and visualized.
- An information architecture is a blueprint for how PHAs at all levels of government invest in information technology (IT), facilitate improved system interoperability, reduce duplication of development, and help ensure the greatest return/value on investment.
- Public health needs to work collectively to develop the shared models and architectures necessary to reduce or eliminate data redundancy, and create systems that share data, especially when they support related processes. Steps need to be taken at the local/state level as well as the national level to move public health in this direction.

With increasing amounts of data coming to public health agencies (PHAs) electronically because of Meaningful Use and other factors, pressure will build within PHAs to critically re-think how they receive, store, use, and visualize information to support programmatic goals and agency missions. In other words, a PHA will need to reconsider its information architecture. *This is absolutely foundational to the future effectiveness of PHAs given that information is the very lifeblood of a PHA.*

Perhaps the greatest challenge for a PHA in re-considering how it conceptualizes the structure and coherence of its data stores is overcoming the historic programmatic stovepipe constraints of separate, non-interoperable “silo” systems. As PHAs look to address current and future information challenges, data integration will become the rule, not the exception.

An information architecture is a blueprint for how PHAs at all levels of government invest in information technology (IT), facilitate improved system interoperability, reduce duplication of development, and help ensure the greatest return/value on investment. A successful agency-level information architecture will prioritize support of public health goals and objectives but within the context of central IT goals and constraints. Taken to a nationwide scale, an overall information architecture for public health could enable it to function more as a nationwide enterprise when it comes to IT, while still allowing jurisdictional flexibility to account for unique needs. As the broader healthcare enterprise moves away from a disease-based model to a more integrated, population health-based model over the next decade, a shared information model will allow public health to take a more consistent, unified, and efficient approach to collecting, storing, and processing the information it creates, collects, and uses.

An information architecture is based on a vision for a public health enterprise that is effectively supported by IT. This vision would support a PHA's well-articulated problem statements that objectively describe current challenges with public health IT funding, and information system development, use, and management. The vision is extended by a set of principles and best practices to guide IT investments that would address those problem statements. Only then can strategic priorities/policies be articulated to operationalize the vision.¹

Information architecture represents the intersection of business process description and information modeling. Business process development begins with a critical examination of how PHAs do what they do and why. Only by understanding and improving processes can the systems and data necessary to support them be properly developed and deployed. A comprehensive information model describes the data required by *all* systems across the PHA and the relationships between data.² Moving forward, PHAs need to think comprehensively about data, strive to reduce or eliminate data redundancy, and create systems that share data, especially when they support related processes. Information technology is then acquired to build and interconnect systems.

Case Study

Most states have individual protocols for the acquisition and analysis of newborn dried bloodspot specimens (NDBS), dissemination of screening results, and the mechanism of data input and information exchange. This does not allow for the easy flow and exchange of critical information between the public and private sectors within the newborn screening system. PHIT convened a workgroup to carry out the business process analysis (BPA) of NDBS from birth through long-term follow-up. The workgroup applied BPA methodology to describe the core activities within the NDBS system. Defining these core activities is the initial step in defining requirements for intrastate and interstate information systems. These information exchange systems can support the informational needs of all the stakeholders involved in the overall NDBS system.

The sequence for developing a public health information architecture would include:

- Collaboratively establishing the domains for public health, and achieving widespread agreement.
- Completing the business process analysis and re-design for areas of public health not already documented (including environmental health and other areas not related to information exchange with healthcare), harmonizing the products from the disparate projects as needed, and assigning each to the appropriate domain of public health.
- Collaboratively developing a limited number of simple but powerful guiding principles in order to establish a clear direction and set of shared values.³

¹ See the Public Health Data Standards Consortium's *Towards Public Health Sector Transformation and Unity: Strategic Plan 2012-14* for an example of many of these elements.

² The Health Level Seven (HL7) Reference Information Model, or RIM, is one such articulation, though it is far from easy to understand and apply (see <http://www.hl7.org/implement/standards/rim.cfm>).

³ See NHSIA's key concepts as an example (www.acf.hhs.gov/sites/default/files/assets/o_01_overviewviewpointdescription_d02.pdf)

- Collaboratively developing the three main components of the architecture: the business, or process, model (which would build on the domains), the information model, and the information technology model. Leveraging other architectures, including the Medicaid Information Technology Architecture (MITA), the Federal Health Architecture (FHA), the Federal Health Information Model (FHIMS), the HL7 Reference Information Model (RIM), CDC's Public Health Information Network (PHIN), and the many business process and data model developments that have already been done at the national and state/local levels.
- Aligning federal funding and IT policy to advance the architecture's principles and priorities.
- State and local enterprise architecture (EA) planning and implementation could proceed based on a widely-accepted public health information architecture. This would include developing agency roadmaps for modernizing information systems based on enterprise goals, platforms, etc., and enhancing capacity for information management and analysis.

Creating such a comprehensive architecture is daunting. State and local PHAs cannot wait for a top-down initiative to define their processes, information, and information technology needs and goals. The development of a national public health information architecture is desirable, but PHAs need to find ways to begin this development in their local environments.

Action Steps for State and Local PHAs

- Start moving your agency in the right direction by examining business processes, developing guiding principles, and raising awareness within the agency about relevant national initiatives.
- Seek out opportunities to work with other agencies to define information architecture collaboratively. Seek out government and foundation funding in this area.
- Focus interoperability with outside data trading partners through a single connection with your agency. This will start to move the agency towards thinking about data strategically and comprehensively, as well as potentially save money on redundant interfaces and focus available expertise.
- Improve the level of informatics training within the agency to improve the overall capacity of the agency to address information architecture issues. Collaborate with state IT resources that may have training and interest in these areas. Particular focus should be placed on business process analysis and requirements development methodologies/capabilities.

Leadership Steps for National Agencies and Organizations

- Consider working collaboratively to establish a clearinghouse/library of business process descriptions, system requirements and specifications, and even prototype requests for proposal (RFP) for local PHAs to access and use to jump start their efforts.
- Continue to actively participate in standards development and harmonization activities, and to communicate broadly within public health about these efforts.
- Develop resources for state and local PHAs concerning the legal barriers at both the federal and state/local levels for sharing data between programs and with external partners.

- Consider embarking on the development of a national public health information architecture based on the outline above. Consider how current activities can be redefined, combined, or leveraged to move in this direction.

More Information

<https://www.hln.com/assets/pdf/UT-White-Paper-Final.pdf>

[http://phdsc.org/about/pdfs/PHDSC Strategic Plan 2012-2014 FINAL.pdf](http://phdsc.org/about/pdfs/PHDSC_Strategic_Plan_2012-2014_FINAL.pdf)

<http://www.phii.org/what-we-do/requirements-laboratory>

<http://www.fhims.org/>

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