

Milwaukee Laboratory System Improvement Program (L-SIP)

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ABSTRACT

The Laboratory System Improvement Program (L-SIP) of the Association of Public Health Laboratories aims to improve state public health laboratory (PHL) system performance through continuous quality improvement. We successfully applied this state assessment tool to a local PHL (LPHL) system by tailoring it to reflect local system needs and created an LPHL system definition explaining how a local system differs from, yet complements, a state system.

On November 18, 2010, 75 stakeholders from 40 agencies assessed the Milwaukee, Wisconsin, PHL system, capturing themes, strengths and weaknesses of the system, and scores for each of the 10 Essential Public Health Services. A Laboratory Advisory Committee analyzed assessment results to identify a strategic focus of research and workforce development and define an action plan, which is now being carried out. Milwaukee's L-SIP process is effectively improving LPHL system research and workforce development while raising community awareness of the system.

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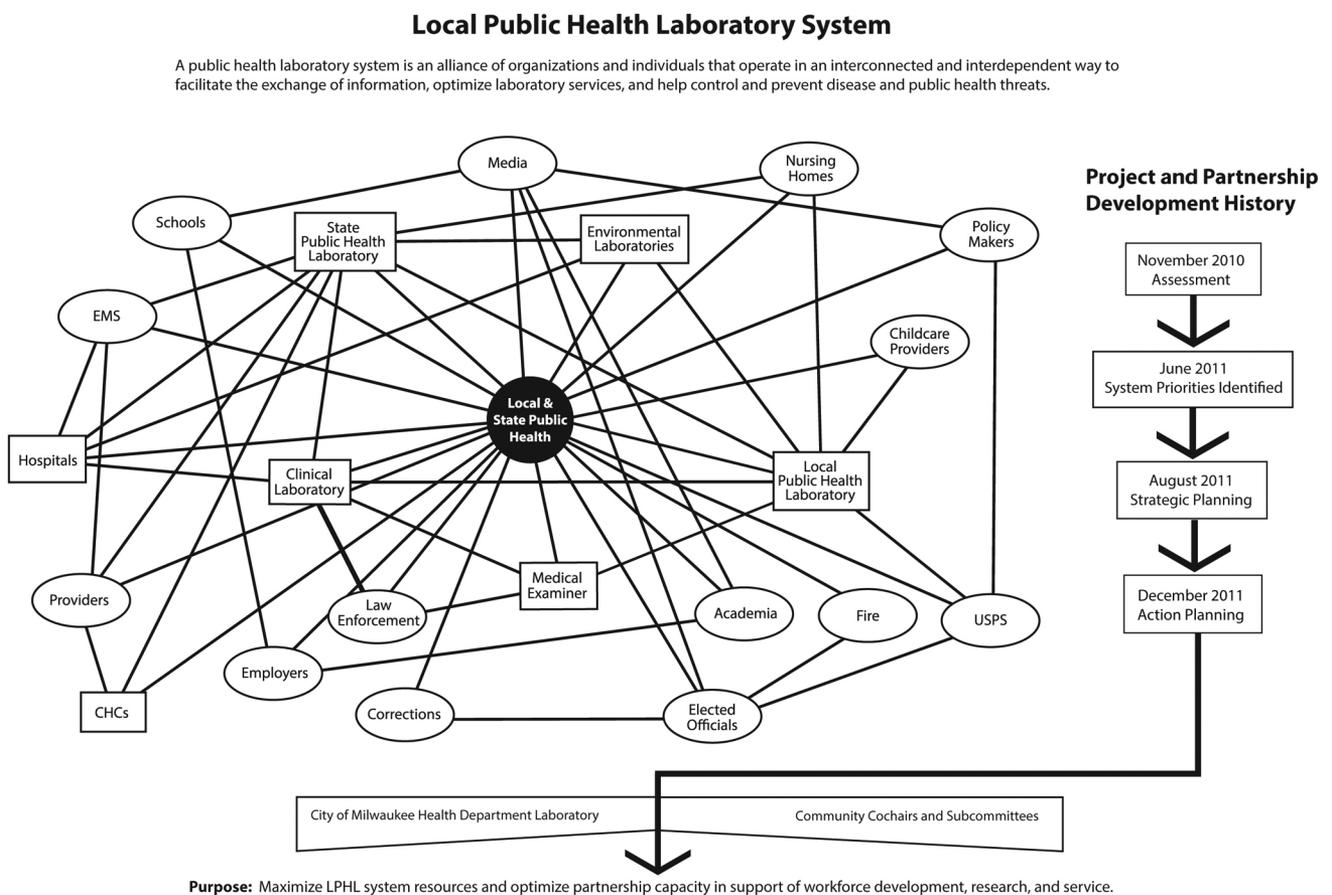
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The public health laboratory (PHL) system is a relatively new concept that defines the efforts of individual states to develop laboratory networks.¹ In 2007, the Association of Public Health Laboratories (APHL) defined a state PHL (SPHL) system as a network consisting of all the participants in PHL testing, including those who initiate testing and those who ultimately use the test results.² The PHL system comprises laboratories and other partners within a state or locality that support the 10 Essential Public Health Services (hereafter, Essential Services),³ with members and stakeholders operating in an interconnected and interdependent way to facilitate the exchange of information, optimize laboratory services, and help control and prevent disease and public health threats. The goal of the PHL

system is to create a comprehensive local or statewide system that can respond to all public health needs and threats (Figure 1).

To improve and assess performance of SPHL systems, APHL, in collaboration with the Centers for Disease Control and Prevention (CDC), developed the Laboratory System Improvement Program (L-SIP).⁴ As of April 2013, 29 states have performed the L-SIP assessment, which is modeled after the proven performance standard assessment process used by local and state public health departments for the last decade. Because the model performance standards were developed for both state and local health departments, it stands to reason that L-SIP could also be used to measure a local PHL (LPHL) system. A convergence of events

Figure 1. L-SIP partnership organizational chart: alliances and connections within the local public health laboratory system



- L-SIP = Laboratory System Improvement Program
- EMS = emergency medical services
- CHC = community health center
- USPS = U.S. Postal Service
- LPHL = local public health laboratory

presented this opportunity to the City of Milwaukee Health Department Public Health Laboratory (MHDL) in Milwaukee, Wisconsin, in 2009.

THE MHDL L-SIP ASSESSMENT

In 2009, due to severe budget projections, the role and capacity of Milwaukee's PHL was reviewed and examined through an analysis of strengths, weaknesses, opportunities, and threats; development of strategies to sustain and improve service to its customers; and development of a business model for the department. Through MHDL participation in the APHL L-SIP subcommittee, it became evident that the direction of the laboratory and structured goals of the L-SIP process could be merged to complement one another to address the needs of the department and improve laboratory operations, ultimately addressing the entire local laboratory system. The pandemic H1N1 outbreak in Milwaukee in 2009 provided the final boost to project the L-SIP process forward by necessitating updated and improved communication with stakeholders, including courier service and a revised laboratory requisition, all of which contributed to a major revenue boost for the department and additional administrative support to proceed with L-SIP. Laboratory revenue allowed the hiring of a consultant/facilitator in 2010 to assist in the early planning stages of the first-ever local use of L-SIP in the nation.

To date, Milwaukee's L-SIP and its partners have (1) conducted an assessment of the LPHL system, (2) analyzed the assessment results and identified

system priorities for improvement, (3) developed strategic plans related to workforce development and research, and (4) developed action plans to achieve system improvements. In so doing, the LPHL system has benefited from system-strengthening activities of numerous interactions and partnerships.

THE SYSTEMS APPROACH

The Essential Services, which were first introduced in 1994³ and defined as those practices or functions that must be in place to assure a fully operational public health system, whether at the local, state, or national level, form the basis for an L-SIP assessment. The 10 Essential Services are presented in Figure 2. The concept of practicing public health through a systems approach began to grow following elucidation of the Essential Services.

The 11 Core Functions of Public Health Laboratories (hereafter, Core Functions) are also considered in the assessment.⁵ They serve as a foundation for measuring various PHL quality systems goals and are the functions that SPHLs provide or assure and describe their expected capabilities in safeguarding the public's health. These Core Functions consist of disease prevention, control, and surveillance; integrated data management; reference and specialized testing; environmental health and protection; food safety; laboratory improvement and regulation; policy development; public health preparedness and response; public health-related research; training and education; and partnerships and communication.

Figure 2. Results of an L-SIP assessment at the City of Milwaukee Health Department Public Health Laboratory, 2010^a

10 Essential Public Health Services ^a	Activity level ^b Percent
1. Monitor health status to identify community health problems.	83.4
2. Diagnose and investigate health problems and health hazards in the community.	89.0
3. Inform, educate, and empower people about health issues.	67.0
4. Mobilize partnerships to identify and solve health problems.	33.0
5. Develop policies and plans that support individual and community health efforts.	30.3
6. Enforce laws and regulations that protect health and safety.	44.3
7. Link people to needed personal health services and assure provision of health care when unavailable.	67.0
8. Assure a competent public and personal health-care workforce.	61.2
9. Evaluate the effectiveness, accessibility, and quality of personnel and population-based services.	50.0
10. Research for new insights and innovative solutions to health problems.	16.7

^aCenters for Disease Control and Prevention (US), National Public Health Performance Standards Program. 10 essential public health services [cited 2012 Sep 7]. Available from: URL: <http://www.cdc.gov/nphsp/essentialServices.html>

^bLocal public health laboratory system performance in each of the 10 Essential Public Health Services was rated on a scale from 0%–100%, based on the level at which the system meets each described activity, where optimal activity = >75%, significant activity = 51%–75%, moderate activity = 26%–50%, minimal activity = >0% to 25%, and no activity = 0%.

L-SIP = Laboratory System Improvement Program

Purpose and evaluation criteria

The purpose of L-SIP is continuous process improvement of the LPHL system. Bringing together the stakeholders to decide how to achieve this goal is unique to each system but ultimately drives the overarching functions¹ of a PHL system to assure that (1) public health threats are detected and intervention is timely; (2) stakeholders are appropriately informed of potential threats; (3) reportable conditions are monitored; (4) specimens and isolates for public health testing are sufficient to provide comprehensive public health surveillance and response; and (5) PHL data are transmitted to appropriate local, state, and federal agencies responsible for disease surveillance and control. Achieving optimal activity within the Essential Services strengthens the system and assures that these functions are met.

The L-SIP assessment provides a measurement tool that evaluates how the system measures up to gold standards, not minimum standards, for each Essential Service. Because an assessment and continuous improvement are the goals of L-SIP, a reassessment is recommended every three to five years.

METHODS

Funding

Grants and other funding streams were necessary to hire a consultant to facilitate and assist with the L-SIP process. Laboratory revenue allowed the initial hiring of a consultant to initiate L-SIP and other related functions in the summer of 2010. Four grants were provided by APHL with CDC support: one mini-grant for the assessment and three consecutive competitive Innovations in Quality Public Health Laboratory Practice grant awards. Additional departmental funding through laboratory-generated revenue allowed the consultant to continue to facilitate meetings and complete additional grant writing between APHL grant awards.

The assessment

Working with APHL, MHDH modified the state L-SIP assessment tools to accommodate an LPHL system, with the understanding that a local system⁶ is different from, but complements, an SPHL system.

As the first LPHL in the nation to implement the L-SIP assessment, MHDH, with the assistance of APHL staff and APHL L-SIP committee membership, took the following steps: (1) developed a definition of an LPHL system,⁷ (2) modified the L-SIP performance-measurement tool so that it was relevant for local application,⁸ and (3) customized the visual depiction of an SPHL system to represent a local system.⁹ Using

those tools and through facilitator-guided discussion, assessment participants rated the performance of the LPHL system in the Essential Services and key ideas.

MHDH's L-SIP assessment, which took place on November 18, 2010, was conducted by 75 system stakeholders representing more than 40 agencies and departments. Participants included clinical and environmental laboratory scientists, local and state epidemiologists, first responders, environmental health professionals, academicians, researchers, regulators, primary care providers, and multidisciplinary state and local public health professionals. As of April 2013, MHDH was the only local laboratory system that conducted an L-SIP assessment.

The Web communicator

Prior to the assessment, an L-SIP Web page using APHL's Web communicator template¹⁰ was set up on the MHDH website. This page proved invaluable in informing stakeholders and providing regular progress updates.¹¹

Milwaukee Laboratory Advisory Committee

The next step following the assessment was forming the Milwaukee Laboratory Advisory Committee (MLAC), a group of 14 leading stakeholders who reviewed the results of the assessment and identified LPHL system issues in need of improvement. The group first met on June 3, 2011.

Subject-matter experts

Once system priorities for improvement were identified, MHDH, supported by MLAC leadership with help from the consultant, recruited 15 additional LPHL system subject-matter experts (SMEs) in the area of laboratory workforce development (i.e., internships and promotion) and research. In August, September, and December of 2011, these stakeholders worked together to develop strategic and action plans to improve the LPHL system.

At the December 2011 MLAC-SME meeting, three subcommittees were identified to implement a strategic action plan for 2012 with specific outcome deliverables related to goals and objectives for (1) research, (2) workforce development-internships, and (3) workforce development-promotion.

Subcommittees and community cochairs

In 2012, four members of the MLAC and SME group were asked to serve as community cochairs, joining with MHDH leadership to work with stakeholder committees to advance and strengthen system partnerships and define L-SIP goals and objectives. Two cochairs assisted

the Research Subcommittee activities, and one cochair each assisted the Workforce Development—Promotion and Workforce Development—Internships subcommittees. In addition to holding committee meetings, the cochairs also reached out to their contacts in the community through one-on-one discussion and various forums to further amplify and strengthen system efforts.

OUTCOMES

Assessment

The final L-SIP assessment score was calculated automatically and provided to attendees on assessment day (Figure 2). This score revealed the main strengths and weaknesses of each of the Essential Services, which were broken down into 25 indicators (1–3 for each Essential Service). The indicators were then further broken down into 44 key ideas (1–3 per indicator), all of which served as the basis for discussion and evaluation. The assessment group rated LPHL system activity for each key idea under the corresponding Essential Service as falling at the levels of optimal, significant, moderate, minimal, or no activity. An optimal rating indicated that >75% of the activity described was met within the system, a significant rating indicated that the system met 51%–75% of the activity described, moderate corresponded with a range of 26%–50%, minimal corresponded with a range of >0% to 25%, and no activity indicated 0% of the activity described.

Notetakers on laptops and facilitators with flip charts captured 109 comments as themes and 72 suggested next steps for analysis and consideration. A 59-page assessment report was compiled and e-mailed to participants and posted to the MHDL L-SIP website,¹¹ and a webinar report was presented to stakeholders in March 2011. Based on a post-assessment participation evaluation completed by 42 attendees, 90% rated the assessment as a valuable process and said they would participate again, with some also expressing interest in being involved in next steps of L-SIP.

Strategic planning team and goals

The MLAC was tasked with using assessment results to guide L-SIP strategic planning. Through its initial meeting, the MLAC determined that Milwaukee's L-SIP improvement efforts should focus on Essential Services 8 (workforce development) and 10 (research), and further refined the system improvement goal as follows: maximizing the LPHL system resources and optimizing partnership capacity in support of workforce development and research and, in so doing, support the Milwaukee Health Department mission to become an academic health department.

With the assistance of 10 SMEs, the MLAC met in August to inventory existing research and workforce development efforts within the system and develop a framework with strategic directions aimed at strengthening workforce development and enhancing research efforts. Through a facilitated process, the MLAC produced five strategic objectives for research and workforce development, followed by 16 and 24 potential action steps for research and workforce development, respectively.

The five strategic objectives for research were:

- Establish leadership and objectives to facilitate LPHL system research.
- Develop a network of scientists and infrastructure to support research.
- Assure sustained funding to empower research.
- Create mechanisms to train researchers.
- Communicate LPHL system research to the public.

The five strategic objectives for workforce development were:

- Educate the public and health-care professionals on the importance of the LPHL system.
- Attract a motivated and highly skilled workforce.
- Retain an engaged and competent workforce.
- Invest in innovative technology to improve efficiency and capacity.
- Capitalize on outbreaks and public health emergencies to highlight the work of the PHL system.

These strategies were further distilled in a December MLAC-SME meeting to actionable and measurable activities for implementation in 2012 (Figure 3), using community cochair leadership with consultant-facilitated subcommittee meetings from February through June 2012.

Cochair and committee activities:

February through June 2012

Community cochairs were secured in late 2011 to assure LPHL system organization as well as stakeholder ownership and commitment to the project. The cochairs met three times from February through July 2012 to provide coordinated leadership for L-SIP and the three subcommittees. They identified three strategies for implementation: (1) facilitating cross-institutional, multidisciplinary research; (2) promoting the LPHL system to attract a competent workforce; and (3) strengthening internships.

Figure 3. Activities to develop time-phased implementation of strategic directions for 2012: research and workforce development activity goals resulting from a 2011 L-SIP strategic planning session in Milwaukee, Wisconsin

<i>Subcommittee: strategic direction</i>	<i>February 28, 2012, committee goals</i>	<i>March 30, 2012, committee goals</i>	<i>June 30, 2012, committee goals</i>	<i>December 31, 2012, committee goals</i>
Research: establish leadership and objectives to facilitate LPHL system research	<ul style="list-style-type: none"> • Identify leaders. • Expand workgroup. • Convene first meeting. • Create vision and structure. • Identify themes and objectives. 	<ul style="list-style-type: none"> • Convene second meeting. • Discuss and develop inventory of researchers and resources. • Identify barriers. 	<ul style="list-style-type: none"> • Begin needs assessment and identify research needs. 	<ul style="list-style-type: none"> • Develop website. • Begin work on MOUs. • Identify funding sources. • Plan research forums.
Workforce Development—Internships: collaborate, systematize, and strengthen internship opportunities across the LPHL system	<ul style="list-style-type: none"> • Identify leader/cochair. • Convene first workgroup meeting. • Identify scope of the assessment/environmental scan. 	<ul style="list-style-type: none"> • Convene second workgroup meeting. • Determine assessment methods. 	<ul style="list-style-type: none"> • Develop assessment tool. • Identify list of individuals and organizations to survey. • Determine responsibility for survey. 	<ul style="list-style-type: none"> • Conduct survey. • Analyze results. • Disseminate findings.
Workforce Development—Promotion: promote the work of the LPHL system	<ul style="list-style-type: none"> • Convene first meeting. • Document success stories. • Identify media outlets. • Develop outreach plan. • Identify and connect with national resources. 	<ul style="list-style-type: none"> • Contact media. • Convene second meeting. 	<ul style="list-style-type: none"> • Produce and deliver product. • Identify and contact resources for funding, grants, and sustainability. 	<ul style="list-style-type: none"> • Produce and deliver product. • Identify and contact resources for funding, grants, and sustainability.

L-SIP = Laboratory System Improvement Program

LPHL = local public health laboratory

MOU = memorandum of understanding

Research Subcommittee

On June 22, 2012, a diverse group of 19 stakeholders met to identify research capabilities, themes, and possible collaborations; determine how best to facilitate laboratory system research; and create an LPHL system research inventory—a searchable database depicting profiles of community researchers, including their current research, research interests, and resources. Common themes that emerged from the discussion on current research, research interests, and resources included:

- Current research: methods (e.g., chemical, biological, microbial, and engineering), biological systems, modeling, and surveillance
- Research interests: linking to other disciplines (outreach), microbiology, contaminants, toxicology and immunology, methods, and surveillance
- Resources: models/centers of excellence, databases, specimen/sample repositories, instrumentation, and students/interns and staff

As a result of this meeting, nine researchers identified 15 new potential collaborations of interest that would

complement their ongoing work. Further discussions have been initiated to link community research databases from the various networks.

Workforce Development—Internships Subcommittee

A cochair meeting in May 2012 with the committee cochair and the Director of Workforce Development and the Public Health Workforce Development Project Coordinator for the Wisconsin Department of Health Services led to the identification of a potential workforce shortage in the area of certified medical laboratory technicians (MLTs). Relevant questions were then incorporated into the 2012 Wisconsin Clinical Laboratory Science Workforce Survey, which has been distributed to laboratories throughout the state.

Next steps include working with stakeholders to assess workforce development issues, such as the capacity of academic/training programs for MLTs, the number of students in the pipeline, internship capacity, graduation rates, and employment outcomes, ultimately determining how to get more students into programs with meaningful internships.

Workforce Development—Promotion Subcommittee
 The Workforce Development—Promotion Subcommittee met in April 2012 and developed strategies to promote the LPHL system, including media outreach, community events, and academic events (e.g., college open houses or career fairs); laboratory tours during National Public Health Week or Medical Laboratory Week; an application for smartphones; a conference for students on laboratory professions; a traveling display focused on LPHL system stories for stakeholders to put in their lobbies; and APHL resources and best practices aimed at LPHL system promotion/workforce development. In July 2012, a student intern drafted three stories on the work of MHDL employees, which will be used to promote laboratory professions within the LPHL system.

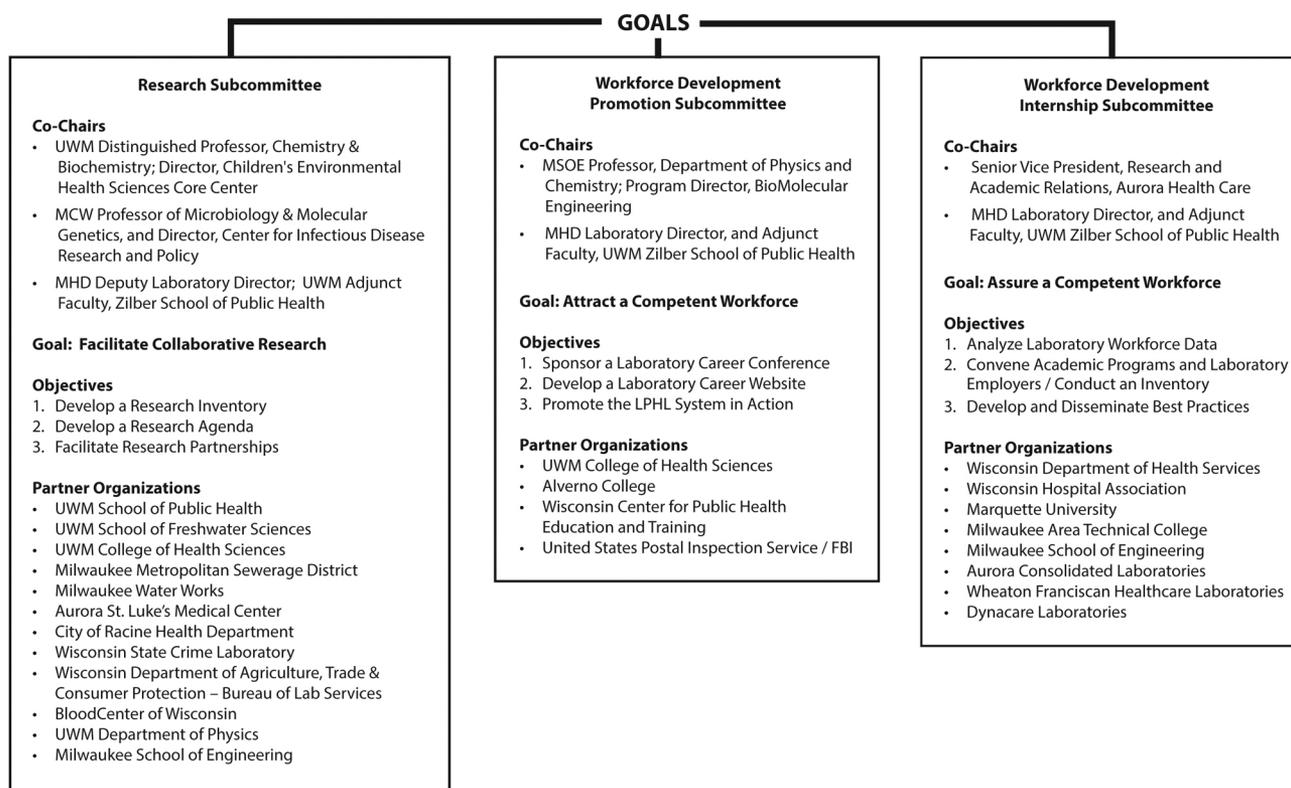
In summary, L-SIP has produced a progressive, stakeholder-guided strategic plan with actionable goals and objectives. Some goals have been achieved while others are in varying degrees of definition and execution by community cochaired committees (Figure 4). The results to date should enhance the public health community response due to increased collaboration and communication. Measurable system improvements in research and workforce development are yet to be determined.

Incidental system-strengthening activities

A number of incidental system-strengthening goals and activities also have been developed as a result of L-SIP discussions. They include:

- Visiting researchers to LPHLs to discuss possible research collaborations

Figure 4. Research and workforce development strategic goals: 2011 City of Milwaukee Health Department Public Health Laboratory L-SIP assessment



- L-SIP = Laboratory System Improvement Program
- UWM = University of Wisconsin-Milwaukee
- MCW = Medial College of Wisconsin
- MHD = City of Milwaukee Health Department
- MSOE = Milwaukee School of Engineering
- LPHL = local public health department
- FBI = Federal Bureau of Investigation

- Speaking requests regarding public health, L-SIP, and PHLs
- Strengthening ongoing relationships
- Interfacing with other local research consortia or planned discussions
- Applying for grants

LESSONS LEARNED

MHDL, like other PHLs, has not typically had a forum for involving multiple system stakeholders. However, the L-SIP process has shown that, when given the opportunity, LPHL system stakeholders are eager to be involved in shaping the public health priorities of the community and recognizing the benefits for their own agencies. Based on Milwaukee's observation, as well as that of many state assessments,¹² the buy-in by local stakeholders would likely hold true for other LPHL systems. As a result of L-SIP, many connections have been forged or strengthened, and partners now better understand one another's roles in the LPHL system. Participants' positive responses to the post-assessment survey indicated that stakeholders find overwhelming value in the L-SIP process and are committed to remaining involved.¹³ The L-SIP process has generated a strategic action plan, and stakeholders continue to enthusiastically participate and offer encouragement and support as improvement strategies are actualized for L-SIP.

As L-SIP continues, efforts will shift to being more action- and results-oriented to reach goals that have been set. Translating strategies into action takes weeks and often months. Consequently, additional time will be required before the true results of L-SIP become apparent: measurable improvements in workforce development and research in the LPHL system. While measuring those outcomes will be challenging, the ongoing activities, interactions, and partnerships accomplished to date offer encouragement and are visible signs of system strengthening.

Delays in meeting the goals of the L-SIP strategic action plan have occurred as a result of scheduling conflicts of busy stakeholders, reflecting the need to plan meetings in advance as much as possible. Another challenge observed is that over time committee members may change, and logistics and strategies require modification to keep the process moving. Means to achieve the goals will change to meet the realities that new stakeholders bring to the table, along with new opportunities, experiences, and ongoing dynamic programs that each new stakeholder can bring to bear in achieving desired results.

The availability of grant funding to support a consultant/facilitator with a strong public health background has contributed significantly to the success of Milwaukee's L-SIP. Therefore, future funding would enable the continuation of Milwaukee's L-SIP, particularly the ongoing implementation of the workforce development and research strategies. Without such a grant, efforts and progress will be greatly diminished. However, the creation of a new job position, Laboratory Operations Manager, will entail some responsibilities to sustain L-SIP activities. Also, several stakeholders and consortia have expressed support and interest in maintaining L-SIP momentum. Another benefit is that L-SIP will factor into the departmental accreditation process that is currently underway, illustrating community assessment and involvement for improved public health delivery.

Through L-SIP, MHDL is clearly filling a community need to lead cross-disciplinary research and workforce development initiatives with a host of community stakeholders. Innovative and significant actions have enhanced the laboratory system and public health delivery.

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