

**MEDISOLUTION & PUBLIC HEALTH
IN THE UNITED STATES**

by

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ABSTRACT

This project examined the American public health market to identify the policy-makers, the driving forces and potential opportunities for a Canadian information technology provider. Public health in the United States became a governmental priority following the terrorist attacks of September 11th, 2001, the subsequent bioterrorism threats and the appearance of diseases such as SARS and the West Nile Virus. New organizations and programs have since been created to enhance the preparedness and ability to respond of healthcare agencies to public health crisis. Increasing investments are made to upgrade the technology used by all levels of healthcare agencies. We found opportunities for the Canadian firm's healthcare applications at the county and city levels, primarily for laboratory systems but also for population monitoring systems. We have identified the organizations responsible for the policies shaping the public health market, the organization providing technical advice to healthcare agencies and hence influencing the purchases, the potential buyers along with the budgets involved. Leads and suggestions are then provided as part of an action plan to penetrate the market, promote the products to the right organizations and target the potential buyers. However, further market research remains necessary to confirm if the American public health market represents a good international opportunity for the Canadian firm. The additional researches would need to focus on required technical adaptations, pricing, costs of delivery, implementation and support as well as a better analysis of the existing competition.

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LIST OF ABBREVIATIONS AND ACRONYMS

ANSI	American National Standards Institute
APHL	Association of Public Health Laboratories
ASTHO	Association of State and Territorial Health Officials
CDC	Centre for Disease Control and Prevention
ESP	Enhanced Surveillance Project
HAN	Health Alert Network
HHS	Department of Health and Human Sciences
HIPAA	Health Insurance Portability and Accountability Act
HIS	Healthcare Information System
HISB	Healthcare Informatics Standards Board
HMO	Health Maintenance Organization
HRM	Healthcare Resource Management
ICD	International Classification of Diseases
INPHO	Information Network for Public Health Officials
IPA	Independent Practice Association
IT	Information Technology
LIM	Laboratory Information Management
LITS	Laboratory Information Technology System
LOINC	Logical Observation Identifiers Names and Codes
LPHA	Local Public Health Agencies
LRN	Laboratory Response Network
NACCHO	National Association of County and City Health Officials
NAHDO	National Association of Health Data Organizations

NAPHIT	National Association for Public Health Information Technology
NEDSS	National Electronic Disease Surveillance System
NETSS	National Electronic Telecommunications System for Surveillance
NHII	National Health Information Structure
PHII	Public Health Informatics Institute
PHIN	Public Health Information Network
PHL	Public Health Laboratory
POS	Point of Service
PPM	Private Physician Management
PPO	Preferred Provider Organization
R&D	Research and Development
SCHIP	State Children's Health Insurance Program
SNOMED	Systematized Nomenclature of Medicine
SOW	Statement of Work
TDA	Technical and Direct Assistance

1 THE PROJECT

1.1 Introduction

The initial idea for the project was to help Medisolution with their market entry strategy in China. However, unexpected circumstances would have delayed the project considerably. Hence we agreed with Medisolution's CEO Mr. Allan Lin to focus our efforts on the company's other non-Canadian market: the United States. This study will analyze the structure of the emerging public health market in this country. The exploratory research will serve as a first step in understanding the dynamics of this market and identify leads for possible business expansion.

Medisolution entered the market recently through the acquisition of DeLair Systems in Phoenix, Arizona. This new office now drives all sales and business development efforts in the United States. So far, they have been relatively successful introducing Medisolution's customized information technology systems to the individual healthcare agencies (e.g. hospitals, clinics, and laboratories). However, the recent acquisition of Event Works in Edmonton has broadened the company's product range and may offer additional business opportunities for the American office. Event Works has developed a system meant for population tracking and monitoring, used mainly for the purpose of public health. Hence, Medisolution is now interested in finding out if such product could successfully be sold south of the border but faces several challenges in the assessment of the market.

While public health is well-established system in Canada, it long remained a concept of less priority in the United States. Until 2001, public health in the U.S. essentially consisted of health standards for food processing and restaurants, vaccines and immunization, along with common health standards within the health care. However, within the local and national news, the government's public health strategies, systems and performances have more recently been center stage. The awareness of the public health sector's vulnerability to intentional and natural threats has been dramatically heightened, particularly following the events of September 11th, 2001 in New York City. Other than bioterrorism, the ineffectiveness of the public health system has been noted through its handling of new diseases such as SARS, the West Nile virus, the monkey pox, the smallpox, AIDS, STDs and even the mad cow disease and the avian flu. With this awareness comes an increased expectation on the part of many for the public health system to be able to protect them and their communities. Unfortunately, this increased expectation has not always been matched with increased understanding and commitment to provide local public health authorities (LPHAs) with the necessary to be able to provide that protection. Beyond funding, the true problem lies in lack of an organized, nation-wide structure for the public health system. The implementation of a large-scale public health network was then strongly encouraged under the Bush administration to improve the country's ability to detect and respond more quickly to public health problems. The mandate is now primarily the one of the Centre for Disease Control (CDC), in collaboration with other public health partners and private information technology vendors.

Without a doubt, the American healthcare system is now undergoing major changes. Our task at this point is to help Medisolution understand those changes by finding out about the current structure of the public health sector and what it is expected to become in the near future. We will also identify the actual and future key players and the issues at stake. In fact, understanding the market structure is the first step in assessing the market potential for the public health and laboratory IT solutions of Medisolution.

1.2 Benefits for the MBA Students

Yi and Martin are respectively from China and Canada, two countries that depend a lot on trading with the United States. This project will benefit our team by helping us gain valuable knowledge about this major – and almost unavoidable – player on the international business scene. While the tendency of many MBA students and new managers in international business is to focus on Asia and emerging markets, one cannot dismiss the importance of the American economy.

On the other hand, health care and public health are areas that are becoming more and more important throughout the world. In designing and implementing both cost-efficient and quality healthcare, countries and organizations soon realized the valuable contribution information technologies (IT) could make. Consequently, spending in IT solutions in healthcare rose rapidly in the last decade as technology became more accessible and more effective. Nowadays, healthcare IT represents a market with tremendous growth potential, and job opportunities!

Finally, from an academic standpoint, this project will allow us to apply what we have learned throughout our MBA program. We have learned to analyze country

marketplaces, market entry strategies and differences between countries in terms of culture, standards and practices. The challenge is interesting since we are now moving away from theory to test our skills and knowledge in a real-life situation, with real products and people. The process is also different since we constantly have to deal with real-life day-to-day limitations, delays and obstacles, far from the controlled classroom environment!

It is also a great learning opportunity from a communication and logistics perspective. Doing international business, we will have to deal on a regular basis with issues and people located in other cities or countries. This project is yet another good exercise at coordinating the efforts of a team spread out in four cities and two countries.

1.3 Benefits for Medisolution

As mentioned earlier, the changes that are undergoing on the public health scene in the United States might result in a land of opportunities for an IT healthcare system provider like Medisolution. However, it is yet unclear what the final picture will be. Our project will provide information concerning the public health system being implemented that may prove useful in orienting further market research and market validation for the existing products.

An obvious benefit is getting valuable information on a market they are much interested in for a minimal cost. This is even more interesting for average-size firms (e.g. Medisolution) with limited resources and time for market research and exploration. In this case, the offices in Edmonton and Phoenix are the firm's smallest ones. In the U.S., the workforce is essentially a salesforce. The Canadian offices and the headquarters in

Toronto usually handle all activities pertaining to product management, research and development and marketing.

Medisolution was enthusiastic about the project for three reasons. It would first help its office in Phoenix with business development and marketplace understanding. As they explained, they do not have anyone to do such work at this moment since everything is oriented toward selling and building awareness.

Second, Medisolution is still expanding considerably in its main market, Canada, and can hardly commit any resources to support their American office. Top management does see the U.S. market as a priority but they would rather strengthen their position in Ontario and Western Canada and use the profits to then fund the expansion in the United States. While some international business experts may argue with that business philosophy, we can still understand the logic behind a “be strong at home before expanding overseas” type of strategy. Therefore, with its current limited resources, the “extra” help was more than welcome!

Lastly, Medisolution saw a value in getting an outsider’s input. The business approach of senior managers and of MBA students can differ sometimes but rather than creating a conflicting situation, it will hopefully result in a mutual learning experience.

1.4 Methodology

The research revolves around three sources. First, information on the company and its products partly comes from Martin’s experience working for Medisolution. Second, weekly conference calls with Michael Hendin, Public Health Products Director and Marc Rubenstein, Vice-President Sales for the U.S. market provided valuable insight

on the current situation in the United States and the company's issues, challenges and concerns. At the beginning, it helped in determining the focus and aim of the project. But down the road, the two managers contributed with personal knowledge and useful documents while getting us in touch with product managers and other specialists when needed.

The following people have participated in the process:

Mr. Michael Hendin (Edmonton), Director of Public Health IT Products

Mr. Marc Rubenstein (Phoenix), VP Sales – U.S.A

Ms. Louise Cardinal (Montreal), VP Sales – Quebec

Ms. Barbara Kaufman (Edmonton), MediLab Specialist

Mr. Paul Hill (Toronto), Executive VP Marketing and Sales

Mr. Allan Lin (Toronto), CEO

Finally, research was conducted on the Internet and through online resources for contemporary articles. All gathered data was then analyzed using both personal knowledge and notions learned in class during the MBA program.

The objective is to provide sufficient information to help Medisolution understand the structure of the public health system in the United States. We will begin with a brief explanation of the current American healthcare system and draw relevant comparisons with the Canadian system. Some of the main characteristics that need to be highlighted are its extreme level privatization and its resulting self-serving attitude, the apparent lack of central leadership and its complexity in regards to the balance between private and public participations. Explanations will also be provided concerning the main reasons that are driving the creation of this new version of the American public health system.

The analysis will then try to address all of the following issues and topics.

- What activities does Public Health in the U.S. engage in?

In other words, how is public health now defined in the United States? Listing the activities handled or to-be handled by the public health structure is the first step in narrowing down key opportunities for IT sales and R&D. The second step consists in identifying what level of government handles each and everyone of them and to what degree (fully or in collaboration with other states, counties, cities or agencies).

- Who are the players in Public Health?

Who are the stakeholders in the design and implementation plan of the new public health infrastructure? Identifying them will help understanding the dynamics of the environment, how decisions are made and why. The analysis of these key players will involve among others their responsibilities and roles along with their range of activities.

- How does the Public Health sector operate?

This pertains to the internal dynamics of the public health system. We will attempt to point out the various relationships among each entity of the public health environment. For instance, what is the process for contract attribution and vendor selection? What are the driving forces behind the implementation of nation-wide and state-specific initiatives? What standards and systems currently exist that require one's awareness and understanding?

- Where is the money? Who has the money? What are the amounts?

The key question for anyone involved in sales and business development. While the aim of this project is not quite a market identification or validation one, the

information, if available, would still be useful. The level to which one can believe that an initiative will be successfully implemented partly depends on the level of funding and government support. While finding out the budget for a particular product does not necessarily mean that it is the amount up for grabs, it does provide an idea of the size of the potential opportunity. Although, this could only be validated with more focused market research on top of this one.

Besides establishing who gets and who spends the money, it is crucial to orient further investigation for market opportunities. It gives the company an idea of whom it should talk to in further assessing the market's potential for its products and eventually promoting them.

➤ Trends

Providing Medisolution with a snapshot of the public health situation in the United States is without a doubt useful, but then again, far from being enough. As mentioned earlier, public health is in development as we speak and changes happen on a regular basis and at a relatively fast pace. A lot of initiatives are still at the experimental stage. While some of them are expected to remain in place, there are examples of others that prove to be failures and were eventually abandoned.

Bottom line is no analysis in such dynamic context would be complete without assessing the trends. Hence, it is important to try to understand in which direction public health is heading. What can we expect in the near future? What are the aspects that the company should keep an eye on? What are the gaps and the key decisions that have yet to be made? We will try to provide as much insight as possible, knowing of course that any

prediction of the future is only relative to the information available and does not come with any guarantee of occurrence!

➤ Opportunities

We will attempt to go beyond just defining the market's structure and dynamics by pointing out gaps and areas in need of improvement that could both translate in business opportunities. The analysis should also provide enough insight to be able to identify where the United States is focusing its efforts and development and what kind of IT solutions and standards they will be seeking. This will help Medisolution see if there is a fit for its current products and/or how should R&D be oriented in order to meet those needs with the American versions of their IT solutions.

Other than that, by looking at the driving forces and the reasons behind this venture, we should be able to identify the sensitive values motivating the Americans. Knowing these could prove helpful in reaching out to them and promoting the company's products and services in a way that taps in their particular values and interests.

➤ Threats

Like the opportunities, we will try to extrapolate the results of our research to identify some of the possible threats. At first glance, the level of privatization with its self-serving attitude and the alleged free distribution of any in-house developed software by government agencies could be examples. We will also try to find examples of what is being done by some competitors.

➤ Conclusion

This being said and done, what are the lessons to learn? Where should the company focus its energy and attention? What are the key areas to keep an eye on? What is the next step for further research, in accordance with the results of the present project?

2 COMPANY OVERVIEW

2.1 The Company

Medisolution is a healthcare information technology company that provides software, IT solutions and professional services to healthcare organizations across North America. The company is a leader on the Canadian market and is progressively expanding in the United States through acquisitions and strategic alliances. Currently, the company's only American office is the result of the acquisition of a firm that has been providing computer systems, software and consulting to the healthcare industry for more than 30 years. The firm is now known as Medisolution U.S.A, and is headquartered in Phoenix, Arizona.

Medisolution's reputation is built on its ability to integrate and ensure seamless interoperability between typically incompatible legacy/existing healthcare information systems and its own healthcare applications. Going beyond just selling, Medisolution's strength truly lies in its ability to develop and support a comprehensive range of integrated solutions intended for all types of healthcare agents (hospitals, clinics, home care facilities, pharmacies and other providers of essential health services). Overall, Medisolution's applications optimize the management electronic health records, maximize the operational efficiencies, improve the delivery of patient care and streamline the administration of the complex operations.

Medisolution offers two distinct product ranges. The first one is the Healthcare Resource Management (HRM) solutions that enable healthcare providers to effectively manage their back office operations, from outsourced payroll processing and staff scheduling solutions to human resource management. These applications are usually sold on an individual basis, with different degrees of customization from one agency to another.

Medisolution also provides a range of Healthcare Information Systems (HIS), which ensure that healthcare providers have the most comprehensive and current patient data at their fingertips, monitor patient movement and level of health within community and contribute to a more effective and productive working environment for health care providers through specialized applications for laboratories, pharmacies and radiology.

The acquisition of Event Works in Edmonton enables Medisolution to now help healthcare providers achieve useful population tracking and monitoring for health aspects such as immunization, vaccines, pregnancies, chronic diseases, cancer and viruses/epidemics. This type of software is expected to grow in popularity since its functions provide valuable information in a context where population growth, bioterrorism threats (e.g. Anthrax, Sarin Gas) and emerging diseases like SARS and the West Nile Virus place serious constraints on the healthcare system.

Other services offered by the company include consulting, project management, installation and technical services, system integration services as well as education & training. Obviously, having a single office in the United States does limit the firm's ability to carry on many implementations at once. Thus, a strategic alliance was made with the French firm Technidata to enable Medisolution to use specially trained

Technidata technicians for its implementations, support and maintenance almost anywhere in North America.

The scope of this research does not require U.S. to focus on particular products, as it is not a typical market research. However, an exploratory research of the public health structure would concern essentially two products: MediPatient+ and MediLab. Throughout the paper, we will tie the analysis to these products whenever it is useful and relevant.

2.2 The Products

MediPatient +: This application is a population tracking and monitoring system that puts a patient's medical history at the fingertips of healthcare professionals. It is an electronic patient record and administration system that integrates the planning, delivery and documentation of all community health and social services in a cost effective manner. MediPatient+ improves the continuity of patient care by enabling community health providers to uniquely identify patients and store their lifelong medical histories in a single health record.

MediPatient+ offers tracking features that provide organizations with detailed coverage rates on immunization and vaccination or data on maternal and infant health and consequently, down the road, evidence of vulnerability to specific diseases within a particular community or segment of population. The application can also monitor the flow of health care services across more than ten different disciplines, enabling healthcare providers to manage resources effectively through the tracking of the care provided to patients.

MediLab: It is a system that enables laboratories to automate the stream of test requests and results and maintain the history of patients through tracking of samples, cultures and blood products. The system however is not yet equipped with a communication interface compatible with the U.S. national public health networks, allowing inter-organization reporting of results. This is a feature much in demand in the United States in this time of national convergence and interoperability of information systems. However, product specialists at Medisolution are confident in their ability to develop a compatible communication interface if the need be since the Internet interface exists already.

When it comes to public health, MediLab can be integrated in MediPatient+ to give agencies the ability to use laboratory data to assess a community's health and risk exposure to disease and epidemic outbreaks.

MediLab is a suitable solution for small laboratories with less than 50 patients per day or a network of laboratories in a county or metro area. It can be used in any kind of laboratory, including: hospital, private and environmental laboratories.

3 PUBLIC HEALTH IN THE UNITED STATES

3.1 Description of the American Healthcare

Healthcare systems in modern societies are traditionally large and complex systems, involving comprehensive allocation of resources and cooperation of different sectors within the society. The healthcare system normally includes 1) “consumers”, which refers to those using or utilizing health care services; 2) “providers”, which refers to hospitals, other health care institutions and professionals; and 3) “regulators / public health care administrators”, which refers to various government agencies. Each component holds its commitments to the society, therefore plays different function in the system.

The United States has a more complicated healthcare system due to its complex mix of public and private involvement. Unlike other advanced industrial countries in which the healthcare system is almost fully funded and highly regulated by the government, the United States has a healthcare service relying more on the private sector for both financing and delivery of health care. Still, the public sector plays a significant role in providing coverage for the elderly, disabled and poor while serving other public health interests such as restaurants’ standards for cleanliness and food handling.

It is critical for those planning to get into U.S. healthcare industry to have a clear ideal about the major components of the system. We are going to provide a detailed description of the essential players in the system with their respective roles and inter-relationships. Medisolution currently sells its applications to hospitals and other health

entities in the clinical environment and is interested in finding out if there would be opportunities on the public health side. We will therefore focus our analysis on the public health sector within the U.S. healthcare system.

3.1.1 Major Components of U.S. Healthcare System

3.1.1.1 Consumers of U.S. Healthcare System

As defined anywhere else, consumers of the U.S. healthcare system refer to those having demand for health care services and therefore seeking and obtaining such services in the market. Apparently, every individual in the society, no matter sick or healthy, is a consumer. In a broader sense, particular organizations purchasing health care services for particular population segments also can be considered as consumers of U.S. healthcare services. For instance, many private companies buy health care services for their employees through corporate plans. Generally speaking, these individual consumers in U.S. healthcare system are targets being monitored in a public health information monitor system.

3.1.1.2 Providers of U.S. Healthcare Services

There are two categories of health care service providers in the United States: institutional and individual. The former includes hospitals, clinics and medical laboratories. The latter refers to individual medical practitioners and nursing professionals.

American Hospitals: American hospitals still make up the largest segment of the U.S. health care system. This is where most serious health care problems are treated and where both public and private payers spend the most money. Currently, the United States

has about 6,000 hospitals. Most are community hospitals, two-thirds of which are private, not-for-profit institutions, while the remainder are investor-owned or public establishments. In addition, the federal government runs some hospitals for the benefit of military personnel, veterans, Native Americans or other specific groups. The noticeable trend happening in American hospital sector is that the number of hospitals has fallen by 14 per cent over the past decade (Health, United States, 2000). The major reason causing such a change is the evolution and gradual reform of payment system in U.S. society (Elizabeth Docteur, Hannes Suppanz and Jaejoon Woo, 2003). Although the number of hospitals decreased continually these years, the importance of hospitals in U.S. healthcare system did not decline much. If Medisolution want to pursue the sales of MediPatient+ in U.S. market, hospitals is unquestionable among the biggest users of this products. Therefore knowing to what extent American hospitals need a system like MediPatient+ and what would affect American hospitals' decision of purchasing such a system is pivotal to Medisolution's marketing operation in U.S. market.

Laboratories: Since data, both clinical and environmental, is the chief output of laboratories, automated systems for its capture, analysis and exchange have become top priorities for public health laboratories across the country (PHIN Stakeholders Conference, "A Work in Progress"). Some states are currently developing their own systems that are PHIN and HIPAA compliant but according to CDC there is still a need for a robust laboratory information management system for public health labs. This standpoint is in favor of an increased participation and involvement from private vendors with efficient, well-established lab systems.

There are two different kinds of lab existing in U.S., the public health laboratories (PHL) and commercial/private-own laboratories. The ratio between the two currently is about 1 to 4 and in total there are more than 13,000 labs in today's America. The services provided by these labs include monitoring for public health threats, disease outbreak investigation and control, detection of treatable metabolic disorders in newborns, historical perspective, response to public health emergencies, and reference and quality assurance services. As we mentioned before, Medisolution has a product specially developed for this labs – MediLab. In another word, these labs are potential users or buyers of the products.

Individual Medical Practitioner and Nursing Professional: Individual medical practitioners and nursing professionals consist of the rest part of provider in U.S. healthcare system. At the moment, there are about three physicians for every 1,000 residents in the United States, one-third of which are primary care physicians and the remainder are specialists. The nursing professionals are post-acute/sub-acute care and long-term care providers.

In a public health monitoring system these above mentioned health care services providers play a very important role: They are the front-line information providers in the monitor system and also the user of the software: initial data input end will be in these hospitals, laboratories and doctor's offices.

3.1.1.3 Payers in U.S. Health Care Services

The decentralised and multi-payer approach to finance health care makes payment the most complicated part in U.S. healthcare system. In contrast with common sense, the consumer may not always be the payer. The involvement of a third-party payer is very

common in the U.S. healthcare system. In fact, three types of payers can be identified in the system: private insurers, public programs and individual payers.

Private Insurers: Around three-quarters of the U.S. population (more than 188 million Americans in 2000), was covered by private health insurance. Employers in either the small-group or the large-group market purchase most private insurance policies (Centres for MediCare and Medicaid Services, 2000). There are now about 950 insurance companies selling health insurance policies in the U.S. (HIAA, Source Book of Health Insurance, 1999-2000, Health Insurance Association of America).

But the U.S. health insurance arrangement has experienced drastic changes since the early 1990s, before which traditional indemnity, fee-for-service insurance coverage was predominant. In order to cope with the change in population size and national economy, especially to meet the demand of cost containment in health care industry, so-called “managed care” appeared in 1970s and evolved rapidly since then. There are several of such managed care vehicles in the U.S., but the most common of these forms of organizations are listed below:

- HMOs (Health Maintenance Organizations): refers to staff-model, group-physicians are part of the same company, or where they were closely aligned through contractual arrangements.
- PPOs (Preferred Provider Organizations): refers to those typically organized in local or regional markets by insurance companies who negotiate fee schedules (discounted provider fees for all patients enrolled in the plan) with networks of providers.

- POS (Point of Service Plans): refers to plan became popular in the 1990s because they contain the attractive feature of allowing any individual to use providers that are outside the plan's network of providers by paying higher co-payments. This increases the choices available to consumers, a feature that is especially attractive to patients who want to see specific medical specialists.
- IPAs (Independent Practice Associations): refers to a type of provider organization where the network of providers is organized and owned by the members. This form of organization has become more popular with physicians in the last few years.
- PPMs (Private Physician Management Firms): refers to a more recent variation of the IPA, an organization that either owns physician practices or sells practice management services (marketing, office management, negotiating with managed care firms) to groups of physicians. (Mark V. Pauly, 1997)

Public Programs: There are two types of public programs, namely MediCare and Medicaid – State Children's Health Insurance Program (SCHIP), which are funded by U.S. government, either federal government alone or together with local government in each state.

- MediCare covers all Americans aged 65 or older as well as qualified disabled persons. American employees contribute a certain amount of money annually to MediCare to secure medical insurance following retirement.
- Medicaid and the State Children's Health Insurance Program (SCHIP) cover essentially poor families with children, low-income elderly and the disabled. The federal government and individual states jointly fund Medicaid under a system

whereby state outlays are matched at a rate determined by the income levels of each state's residents. Each state designs and administers its own program.

Individual Payers: Sometimes, individual Americans have to pay the costs associated with the use of health care services, including deductibles, co-payments, co-insurance and payments for services not covered by insurance.

If we try to speculate the implication of a public health information monitoring system to these health care services payers, we can easily figure out that these payers would be potential beneficiaries and payers of a population health monitoring system. It's well recognized that prevention is more cost-effective than cure in a healthcare system. Even though a comprehensive monitoring system is obviously essential and helpful for the prevention, the huge investment on such a surveillance system including hardware, software, and daily maintenance of the database is not affordable for any individual or single institutions. But government or insurance corporations might be potential buyers or sponsors of such a monitoring system if the investment proves lower than the cost of cure afterward. First of all, both government or insurance corporations have been faced by the increasing healthcare expenditures for a long time and attempt to lower the cost in the future. This explains why the American government is gradually reforming its healthcare system and why insurance corporations increasingly promote various managed care vehicles. Secondly, government and insurance corporations are the ones that possess the necessary financial resources to meet the sizeable investment needed for population monitoring systems. Last, since the government and insurance companies are major payers in healthcare system and important sponsors of healthcare services providers, they normally can affect the purchasing decisions of the services providers. Therefore,

Medisolution could try to approach some of these payers to break into the market. We will address this later in the paper since more analysis is required at this point to conclude on these potential clients.

3.1.1.4 The Role of the U.S. Government in the Healthcare System

The U.S. government takes different roles in the healthcare system. First of all, it is the biggest purchaser of health insurance and third-party payer for health care and it accomplishes this through Medicaid / Medicare program. Secondly, the U.S. government is the regulator in national healthcare system. In reality, the regulation of the sector is a shared responsibility between the federal and state governments, the boundaries of which are not always clear. As regulator, the responsibilities of the U.S. government mainly include supervising the health care services quality and regulating the providers to control spending. Last, the U.S. government is also responsible for taking care of all the issues relating to public health concerns and interests like serving as a primary locus for collecting health data and the principal source of funding for health services research. Since these normally fall into not-for-profit sectors and require large capital investments, the federal government is the only one that can take such a role. Based on this, Medisolution may have to rule-out private healthcare service providers or give up approaching insurance companies, in the initial stage at least of introducing their products to American market. These two potential segments (private providers and insurance companies) are more cost-sensitive and profit-driven and may present a bigger challenge for Medisolution. In the early stage therefore, government agencies might be a better option to start with.

3.1.2 Public Health in the United States

Traditionally the healthcare system in a society encompasses two sectors: the public health and the clinical health. There are many distinctions between the two. Public health is an integrated system of various professional disciplines including medicine, nursing, nutrition, environmental sciences, health education, health services administration, behavioural sciences, information technology, and social work with its activities focusing on entire populations rather than on individual patients. The mission of public health is to "fulfil society's interest in assuring conditions in which people can be healthy" (Institute of Medicine, Committee for the Study of the Future of Public Health, Division of Health Care Services, 1988). The government is the only one that holds responsibility to its population and has the resources and abilities to undertake such a costly, demanding task.

U.S. Public Health commits to improve and enhance the quality of American people's lives through organized, interdisciplinary efforts addressing the physical, mental and environmental health concerns of communities and populations at risk for disease and injury. (Stephen J. Williams, 1996) By adopting health promotion and disease prevention technologies and interventions, the U.S. government holds its commitment to American people.

The American public health sector provides American people a broad array of comprehensive health services including (Anthony DiStefano, 2000):

- Monitor of health status to identify community health problems. Public health professionals monitor and diagnose the health concerns of the entire nation and promote healthy practices and behaviours to ensure the population stays healthy.

- Diagnose and investigate health problems and health hazards in the community.
- Inform, educate, and empower people about health issues.
- Mobilize community partnerships to identify and solve health problems.
- Develop policies and plans that support individual and community health efforts.
- Enforce laws and regulations that protect health and ensure safety.
- Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
- Assure a competent public health and personal health care workforce.
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
- Research for new insights and innovative solutions to health problems.

We can easily figure out that among these ten essential services, monitor health status to identify community health problems is the most basic and important one. If Medisolution can convince American government that it can enhance American organizations' ability of dealing with public health concerns with its population monitoring and lab solutions, Medisolution may have a better chance to success in the American market.

3.2 Key players in U.S. Public Health

The public health system in the United States is currently managed and driven by a multitude of organizations, at a federal, state, county and local/city level. The focus will be on the main ones and explanations will be provided regarding their respective role and responsibilities in the development of a nationwide public health network and in the integration of information technology along the way. The analysis will also include

information about the budgets and the range of each organization's influence on the development of the U.S. public health sector.

3.2.1 HHS (Department of Health and Human Sciences)

Located in Washington, DC, the department of Health and Human Sciences is the United States government's principal agency for protecting the health of all Americans and providing essential human services along financial, medical, logistic and technological support for all entities within the U.S. healthcare system. In many regards, it is the equivalent of the Canadian Ministry of Health. It heads a wide variety of national health programs (e.g. research, funding) and specialized organizations. For the latter, our report will solely focus on the most relevant one to public health: the Center for Disease Control and Prevention (CDC).

HHS also works closely with state and county administrations toward the improvement of health care delivery and, among others, integration of technology for increased efficiency in immunization, public health, bioterrorism preparedness and disease control and prevention. Hence, many services provided at the local level by state or county agencies, or through private sector grantees are essentially HHS-funded. In addition to the services they deliver, the HHS programs provide for equitable treatment of beneficiaries nationwide, and they enable the collection of national health and other data.

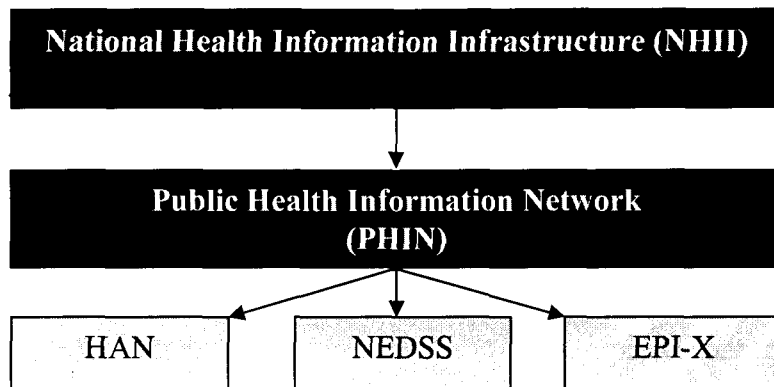
The aforementioned programs are administered by eleven divisions, among which eight are agencies involved in U.S. public health (Appendix 2). One of them, the Office of Public Health Emergency Preparedness, was created in 2002 to coordinate efforts against bioterrorism and other emergency health threats. It is responsible for managing

and granting funds to public health partners. Recipients will use the funds to increase coordination on disease reporting among hospitals and local and state health departments, enhance such coordination between public health laboratories and hospital-based laboratories, and harmonize the communications capabilities of these entities. In other words, it enables them to participate in a nationwide health network. These recipients essentially represent potential clients for Medisolution and the sections 4 and 5 will provide more information on how to target these opportunities. On May 24th, 2004, HHS announced a budget of U.S.\$498 million for states, territories and four metro areas (New York City, Chicago, Los Angeles and Washington, DC) (Broome, 2003). The Appendix 5 presents the break down of this budget per state and jurisdiction for the upcoming fiscal year. This money represents the second round of funding to improve the public health IT infrastructure and preparedness. This second round also includes \$870 million from CDC (Broome, 2003). The breakdown helps assessing the size of funding each state gets and where the major federal investments are made.

Another impact the HHS has on information technologies used in healthcare results from its policies and laws regulating all healthcare activities. For instance, since 1996 HHS has been enforcing standards concerning electronic transactions and codes used in healthcare. This obliged the vendors to adapt their applications to comply with the new standards and regulations. Medisolution should therefore make sure any application introduced in the United States uses the right set standards, in accordance with the HIPAA (Health Insurance Portability and Accountability Act, discussed further). We do not have a clear idea of the implications for Medisolution due to our lack of

knowledge of the level of compliance of the firm's applications. For the same reason, it is hard to do any cost analysis to make one or many products compliant.

Last but not least, HHS is the driving force behind the federal plan called the "National Health Information Structure" (NHII), which encompasses all technological initiatives by the CDC and other healthcare organizations. The driving forces within the NHII are PHIN, which includes the Health Alert Network (HAN), the National Electronic Disease Surveillance System (NEDSS) and the Epidemiology Reporting System (EPI-X). These programs will be further explained in the following section.



- HHS Budget for 2004 -- U.S.\$548 billion
- HHS employees – 66,639 (federal, state, county and city levels)

3.2.2 CDC (Center for Disease Control and Prevention)

Established in 1946 as the Communicable Disease Centre, the CDC is headquartered in Atlanta, GA. Working with states and other partners, CDC provides a system of health surveillance to monitor and prevent disease outbreaks (including bioterrorism), implement disease prevention strategies, and maintain national health statistics. It is one of the major players in the implementation of the new public health

system. CDC's presence and influence can be seen through its many initiatives such as the National Electronic Disease Surveillance System (NEDSS), the Information Network for Public Health Officials (INPHO) and the Public Health Information Network (PHIN). These programs are the foundations of the American public health system of tomorrow and will dictate in that sense the direction information technology development has to take.

The development by CDC of super-infrastructures such as the three mentioned previously drives the development of IT systems at the local level. Besides that, the CDC is also involved in providing funds and technical expertise to all levels of public health that are willing/trying to adopt and implement the new standards and technology. This being said, the CDC does not endorse or recommend specific vendors throughout its funding programs. Recently, several states have received funding from CDC to begin the development of their own state-based surveillance system. Meanwhile, the CDC is developing a "base system" (template) for the states that prefer that option to developing one of its own. A pilot of this "CDC base system" is undergoing in Nebraska and Tennessee with significant involvement from the local health departments. Other than that, most states and a few key local health departments have also received funding to conduct assessment and planning activities of their current IT systems. The reports that will fall out could provide useful insight to Medisolution to target key local agencies planning their IT purchases.

- CDC Budget for 2004 – U.S. \$7 billion
- CDC Employees – 8,569
- Director -- Julie Louise Gerberding, M.D., M.P.H.

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John Loonsk, Associate Director for Informatics

Tim Broadbent, Acting Deputy Director, Office of Integrated Information Systems

3.2.3 NAPHIT (National Association for Public Health IT)

NAPHIT was formed to help entities involved with public health information technology deal with the challenges following the events of September 11th 2001, the subsequent threats of bio-terrorism, and an growing role for (and necessity for) technology in public health programs and organizations. NAPHIT members represent states, territories, locals and other public health agencies and organizations. NAPHIT, a non-profit organization, is the centre-point of discussions and decision-making on public health information policy, best practices as well as development and adoption of standards.

This organization impacts the private providers of software since it is the reference for all IT people in public health. One of NAPHIT's major responsibilities, after all, is to assist its members in the evaluation, selection and implementation of information technology.

NAPHIT just published its strategic plan for the next five years (see Appendix 3). In its plan, NAPHIT identified the following as one its key strategic issues:

“It is a key time for public health information and infrastructure development, due to recent threats and renewed commitment of federal government.”

NAPHIT believes this to be one of the crucial objectives for the next 3 to 5 years for the public health system. As we speak, all entities involved in public health now agree

on the need for strengthening the country's public health infrastructure. In that regard, NAPHIT intends to promote standards in data coding, messaging, architecture and strategic planning as well as CDC's PHIN.

Hence, private vendors like Medisolution need to stay aware of NAPHIT's objective because its growing influence on national committees can influence the R&D strategies, the IT purchases by its members and the federal directives for the allocation of funds for IT development, maintenance and support.

3.2.4 NACCHO (National Association of County and City Health Officials)

The National Association of County and City Health Officials (NACCHO) is the national non-profit organization representing the local public health agencies (LPHAs). The local agencies include the ones located in cities, counties, metros, districts and Native reserves (Tribal agencies). NACCHO provides information, consulting services and technical assistance to local health departments. At the national level, it facilitates the creation and maintenance of partnerships among local, state, and federal agencies in order to promote and strengthen the public health system. Its role and influence within the LPHA world is similar to those of the NAPHIT for IT specialists within the healthcare system. The association is the main responsible for driving the IT development and the strategies at the local and county levels. It is worth mentioning too that NACCHO currently receives support from the CDC to involve local public health agencies (LPHAs) in the development and implementation of its National Electronic Disease Surveillance System (NEDSS). This will contribute to the standardization of the codes used in public health and a quick adoption by local agencies. NEDSS having been declared the official

communication system linking the local agencies to CDC, any public health application should be compatible with NEDSS to be able to penetrate the market.

The local agencies probably represent Medisolution's main market considering its product range is mostly tailored for individual clients (e.g. hospitals, laboratories, clinics, counties, cities) rather than a national structure. This of course does not imply that there is no potential for the company at the state or national levels. However, the applications at the federal level are traditionally designed in-house (e.g. CDC IT department). As for the state level, Medisolution's applications probably would not fit very well since they are designed for small, local agencies. Moreover, the only interest for IT systems at the state level would be for population monitoring, something MediPatient+ could do. However, MediPatient+ works with health records and no client health information is maintained in the statewide database (Kratz, 2003). Needless to say however that gaining NACCHO's support for its products could prove to be a quite rewarding strategy for Medisolution in expanding its client base.

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3.2.5 ASTHO (Association of State and Territorial Health Officials)

The ASTHO is another national non-profit organization that represents the state and territorial public health agencies. It is basically responsible for the agencies above the LPHAs, represented by the NACCHO. ASTHO and its members are dedicated to formulating and influencing sound public health policies. Concretely, it participates in the allocation of the HHS funds for IT improvement. For the same reasons mentioned for the NACCHO, Medisolution should stay aware of the initiatives and strategies endorsed by

the ASTHO since these will shape the IT purchases from the state health departments, which ultimately influence the choices made by the county, city and local health agencies.

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3.2.6 APHL (Association of Public Health Laboratories)

The Association of Public Health Laboratories (APHL) is the organization that heads all public health laboratories in the country. It is a key player because it influences the development and the performance of public health labs, which are the front line of any public health initiative and the main source of information for national public health monitoring programs such as CDC's PHIN and NEDSS. Although it does not deal directly with independent and commercial labs, it does work hand-in-hand with them to improve the overall quality of output and result reporting efficiency. While public and private labs did sometimes viewed one another as competitors, a growing number of laboratories are finding that there is much more to gain from cooperation than from competition.

In a 1999 article published in the Journal of the American Medical Association, it is mentioned that mandatory reporting by healthcare professionals and clinical laboratories for some diseases under national surveillance is as low as six percent. Considering that the federal objective in public health is to create a national network for disease reporting, a lot of work and investment will be required to improve that percentage. Hence, large investments are made to develop the public health labs, which creates opportunities for IT vendors that possess reporting-specialized applications.

APHL's support is also crucial when it comes to promoting policies, the adoption of standards for results coding (e.g. LOINC and SNOMED) and reporting communication channels (e.g. NEDSS). Funding to purchase and/or develop IT systems is often made conditional to compliance with these policies, standards and communication systems. Medisolution's bids should then take this into account.

Overall, the recent threats coming from bioterrorism and new diseases have demonstrated the inefficiency of laboratories in the United States. During the Anthrax attacks, over 100,000 tests were done and yet, none of the results were communicated to the federal authorities electronically (APHL PHIN Summary, 2003). The APHL understands more than ever the weaknesses and hence supports massive investment to revamp the technology currently used. In a recent APHL report on PHIN, the organization states that the laboratory information management systems in most if not all states need to be upgraded or replaced. This represents a tremendous opportunity for Medisolution and its proven lab system, MediLab. Plus, considering that the APHL supports further integration with national reporting networks for better public health monitoring, there might be an interesting possibility to package MediLab with the population monitoring application MediPatient +. Hence, the firm needs to position itself quickly to be part of the APHL's endeavour to upgrade its technology and electronic reporting capacity.

Finally, the APHL is the driving force behind the establishment of the Laboratory Response Network (LRN), which links both public and private labs. The APHL, in collaboration with the Public Health Informatics Institute, anticipates to be done in the summer of 2004 with the design specifications of the next generation of laboratory IT

systems standards and protocols. Since most – if not all – labs within the LRN will be expected to adopt these processes and standards, Medisolution needs to keep an eye on the outcome of this collaboration to ensure its product MediLab remains a compliant IT solution that can meet the public health labs’ needs.

The 26 state and local public health laboratories collaborating in this project (for design and pilots) are: Alaska, Arizona, Arkansas, Colorado, Florida, Hawaii, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, Nevada, New York, New York City, Oklahoma, Oregon, Vermont, Virginia, Washington, West Virginia, and Wyoming. It is safe to assume that these states are closer than others to the final adoption of new lab systems. Therefore, Medisolution’s priority should be these states.

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3.2.7 PHII (Public Health Informatics Institute)

The Public Health Informatics Institute advances the ability of public health practitioners and healthcare IT specialists to apply and manage health information systems that can improve public health capacity and effectiveness. The PHII thus fosters collaboration among public health agencies to eliminate redundant efforts, speed up the development of standardized processes and overall reducing costs through the adoption of strategic information technology.

PHII currently assists many organizations such as the APHL to develop in-house software applications to be eventually distributed for free. In a sense, it can be seen as a competitor for Medisolution but the evidence found so far is not conclusive.

3.2.8 ANSI (American National Standards Institute)

ANSI's Healthcare Informatics Standards Board (HISB) provides an open, public forum for voluntary coordination of healthcare informatics standards among all standard developing member organizations. Every major developer of healthcare informatics standards in the United States participates in ANSI HISB. The ANSI HISB has 27 voting members and more than 100 participants, including ANSI-accredited and other standards developing organizations, professional services providers, private companies, federal agencies and others. When mentioning that Medisolution should investigate different alternatives to be more proactively involved in the next generation of public health systems, participation in HISB could be a good start.

3.3 How the Public Health Operates: the Driving Forces

Building on the availability of new technological advances, major national initiatives are underway to develop health information systems that improve the effectiveness, efficiency, and overall quality of healthcare in the United States. At the top level, there is the National Health Information Infrastructure (NHII) initiative, which proposes a network of interoperable systems encompassing clinical/lab data, public health and personal health information.

Within the sphere of public health, the CDC is developing the Public Health Information Network (PHIN) – a framework for crosscutting and unifying data streams that enable the early detection of public health issues and emergencies. PHIN encompasses the Health Alert Network (HAN), a program to ensure communications capacity, including full Internet connectivity and training, at all local and state health departments; the National Electronic Disease Surveillance System (NEDSS), an initiative

that promotes the use of data and information system standards to advance the development of efficient, integrated, and interoperable surveillance systems at federal, state and local levels; and Epi-X, a secure, web-based system for sharing health surveillance information among local, state, and federal agencies.

Another nationwide system currently being developed is the Laboratory Response Network (LRN) to link private and public laboratories toward a common, to increase the quickness and responsiveness of the public health system in the event of bioterrorism or other health-related threats.

Finally, there are codes and standards used throughout the systems that obviously shape any IT development. Among others, there is the act regulating the transmission of health and personal information among healthcare agencies (HIPAA), the codes and standards being adopted in the labs (LOINC and SNOMED) and the standard for messaging and reporting (HL7).

3.3.1 PHIN

It has demonstrated – and acknowledged by the healthcare partners – that an integrating and unifying framework is needed to better monitor all the data streams for early detection of public health issues and emergencies. The Public Health Information Network (PHIN) is this framework. Through defined data and vocabulary standards and strong collaborative relationships, this network should enable consistent exchange of response, health, and disease tracking data between public health partners. The involved partners and the resulting dynamics within the PHIN can be found in the Appendix 4.

As mentioned earlier, PHIN uses a wide variety of systems for early detection (BioSense), surveillance (NEDSS), secure communication (Epi-X), information dissemination (HAN) and public health response functions, including lab, outbreak and vaccine management and administration. The problem is that there is currently many systems in place that support communications for the public health labs, the clinical community and the state and local health departments. However, most of these systems operate in relative isolation, thus not capitalizing on the potential for an integrated, nationwide data exchange. Other main issues pertain to the quality and quantity of data, the standards for reporting as well as security and privacy issues of the cases reported.

PHIN comprises five key functions: detection and monitoring, data analysis, knowledge management, alerting and response. Throughout these functions, PHIN intends to focus on the use of data and information systems standards to push the development of efficient, integrated and interoperable (the ability of one computer system to exchange data with another computer system) health information systems at the state and local levels. Hence, it requires the collaboration of federal, state, county and city partners to develop protocols but more importantly to adopt them. It is currently proposed by CDC to tie all grants and funding for IT development to the condition of having a resulting PHIN compatibility of the new systems. To date, all states have received funding for assessment activities and 36 jurisdictions have received funding for development. We can add to this the emergency preparedness and bioterrorism response funds allocated by the CDC to 62 state, territory and large metropolitan health jurisdictions in 2002, again to develop the public health labs IT systems and the overall technological capabilities of all healthcare agencies.

In conclusion, the initiative seems to be promised to a great future due to the serious commitment of the federal government and all key healthcare players to continuous and growing funding. This creates an opportunity for a partnership between public health and the vendor community (e.g. Medisolution) in developing the necessary technological and technical aspects of this architecture. The concerns are about interoperability and compatibility and no proven system is currently available. Medisolution can promote the benefits of a wide adoption of its applications. They have a proven track record of inter-operability and uniformity among all local agencies of a region automatically guarantees compatibility. It also saves the cost and time of developing in-house IT systems. By working closely with CDC, Medisolution can make sure that its solutions meet the PHIN requirements and fit in the long-term IT development strategy of the region.

3.3.2 NEDSS

NEDSS is the disease surveillance and investigation component of PHIN. The vision behind it is to have integrated surveillance systems that can transfer relevant public health, laboratory, and clinical data efficiently and securely over the Internet. The NEDSS initiative is made up of the NEDSS System Architecture, the NEDSS Base System, and NEDSS Electronic Laboratory Reporting System. To initiate implementation of NEDSS, states have received funds to either develop their own systems using specified NEDSS standards, or to adopt the CDC-developed NEDSS Base System. The current level of implementation of NEDSS can be seen in the appendices section. The Appendix 7 illustrates the implementation status of disease and medical reporting systems such as NEDSS and PHIN. The appendix 9 on the other hand shows the development status of

NEDSS Base Systems (NBS) which essentially consists in a platform upon which the public health surveillance systems, processes, and data can be integrated in a secure environment. It is a platform that will enable agencies to adopt all CDC-developed systems and hence, it diminishes the opportunities of the private vendors. Yet, it does not totally exclude the possibility of private systems being implemented on the NBS platform but we have no information as to whether it is possible or desirable to do so.

According to CDC, NEDSS is based on the following principles:

- Utilization of industry standards;
- Reliance on off-the-shelf software;
- Internet-based secure transmission of data;
- A common "look and feel" of systems;
- Common reporting requirements; and
- No requirement for specific software use (i.e. universal compatibility).

Right now, the NEDSS Client System is being developed by a software engineering company, Computer Sciences Corporation (CSC), in collaboration with the CDC and some state partners. Ultimately, NEDSS is meant to integrate and replace several current CDC surveillance systems such as the National Electronic Telecommunications System for Surveillance (NETSS), the HIV/AIDS reporting system, the vaccine preventable diseases and systems for tuberculosis and infectious diseases.

The efforts in linking all labs (NEDSS) to report data and the money spent on developing IT systems for the same labs present interesting opportunities. However, as we speak, Medisolution lab system is not NEDSS compatible by definition and does not offer an equivalent interface that could serve as a messaging function to relay data to the PHIN. However, it does possess a web-based interface allowing reporting to external

agencies. Hence, adaptations to the product MediLab would be to match the standards used by NEDSS for message format (e.g., HL7), electronic data interchange (EDI), XML data exchange capability (Internet), lab and clinical terminology (e.g., LOINC, SNOMED) and of course, security. Another possibility may reside in the capacity to link locally the NEDSS client application to the MediLab application. However, it is impossible for us to evaluate the costs and extent of needed adjustments due to lack of technical knowledge and information on the costs of the R&D processes.

3.3.3 HAN (Health Alert Network)

Created in October 1998, HAN's purpose is to increase the capacity of public health agencies to respond to an emergency. This implies a specific, sometimes unique, state-defined structure that links all state, county and local health agencies and clarifying the accepted protocols of communication and coordination. Although funding for HAN supports connections to the Internet, the fact remains that many agencies still do not use healthcare IT systems that possess Internet compatibility. Besides, in the event of emergency where the Internet would not be accessible (or for the agencies who simply do not have access to the Internet), information broadcast technologies need to remain available and functional (e.g., blast fax services, autodialing).

In many states and localities, while HAN began as an infrastructure to increase the agencies preparedness to respond to public health emergencies, it has evolved into an integrated information and communications system platform for all day-to-day operations and programs. For instance, the disease surveillance and electronic laboratory reporting through NEDSS runs on the HAN platform.

At the moment, according to CDC, the organization is providing HAN funding and technical assistance to the following recipients:

- All 50 state health agencies, the District of Columbia;
- Eight territories;
- Two-thirds of the nation's counties;
- Health organizations and major hospital networks;
- Three metropolitan health departments (Chicago, L.A., New York City);
- Twenty-one academic centres.

3.3.4 HIPAA

The Health Insurance Portability and Accountability Act was created in 1996. Its mandate was to develop and adopt national uniform standards for electronic transactions such as the healthcare claims, the healthcare payments and premium payments to insurance companies. In addition, HIPAA was also responsible for determining the standard code sets to be used in these transactions. As for health information privacy, the HIPAA Privacy Standard establishes rules to assure the confidentiality of medical records and other personal health information to protect patient privacy. In other words, it means that only relevant data about patients may be communicated among healthcare agencies for recognized national needs such as the bioterrorism preparedness and response initiative, the monitoring of diseases or the health emergencies.

The public health system is not yet mandated under HIPAA to adopt standards for electronic health care transactions, except as payers and providers. Nonetheless, the Public Health Data Standards Consortium member organizations still agreed that it made good sense adopting the same standards in an effort to standardize all processes within U.S. healthcare.

New developments are expected in the future and Medisolution should keep an eye on these to assess the consequences on its product offer. According to healthcare authorities responsible for HIPAA, this is the calendar for development and regulations compliance:

- Unique employer identifier July 30, 2004
- Security requirements April 21, 2005
- Unique identifier for providers None; only proposed rules
- Unique identifier for health plans None; proposed rules are being prepared.

Electronic health care transactions, the code sets used in transactions and the health information privacy have already been addressed between in the last couple of years.

3.3.5 HL7

Health Level 7 is the range of standards and protocols used for most transmission of clinical and administrative data among healthcare entities. It defines for instance the fields, the format of the content and the security dimensions of the messages and data reports. HL7 hence contributes to the exchange, management and integration of health data and the management, delivery and evaluation of healthcare services. In both cases, it is at the heart of all the nationwide initiatives like PHIN. The federal authorities want the public health system to fully adopt HL7 as soon as possible. However, HL7 is also used in other countries such as Canada and consequently, does not require any particular product adaptation on Medisolution's side.

There are still some PH communities (outside of CDC and public health partner control, but part of the overall PHIN) not using HL7 messaging formats (CDC Report, Gartner 2003). While Medisolution can help those organizations improve their IT infrastructure, they can at the same time bring them up to speed for national standards adoption, as prescribed by HHS.

3.3.6 LOINC and SNOMED

These two are essentially the standard codes that the public health authorities are pushing forward as the standard for all new IT system in public health and private labs, under the umbrella of the Laboratory Report Network (LRN) and the PHIN.

LOINC (Logical Observation Identifiers Names and Codes) codes are universal identifiers for laboratory and other clinical observations. The laboratory portion of the LOINC database contains the usual categories of chemistry, hematology, serology and microbiology (including parasitology and virology). The clinical portion of the LOINC database includes entries for vital signs, hemodynamics, obstetric ultrasound, cardiac echo, urologic imaging, gastro-endoscopic procedures and other clinical observations. As a result, an application like MediLab would most probably be required to use the LOINC Codes, in accordance to the national convergence.

SNOMED (The Systematized Nomenclature of Medicine) is the terminology for encoding the medical record. SNOMED plays a role in the standardization of public health data reporting by being the common languages for all agencies. Besides SNOMED however, the American health agencies also use ICD-9 (International Classification of Diseases, 9th version) for both billing and patient records. There are talks right now to

upgrade to ICD-10, the most recent version. This would be great for Medisolution since all its products are originally designed in and for Canada, which uses ICD-10. It would remove one of the market entry obstacles, coming from different national health standards. Although, the transition to ICD-10 is meeting a lot of opposition from healthcare agencies, so this conversion should not be expected in the near future.

3.4 Main Challenges of the Public Health System Endeavour

First of all, it is important to understand the key differences between public health and private informatics. The main one is probably the difference in understanding how information systems can support the performance of work within the organization. Most people in private industry are working on their third or fourth generation information system support. In public health, information systems are still implemented to replace paper. *Pete Kitch*, a consultant to the LIM systems requirements definition project and the project director for Kansas Integrated Public Health System (KIPHS) co-authored the first book ever published on effective informatics principles and practices as applied to public health. In his book “*Public Health Informatics and Information Systems*” he mentions:

“(...) public health labs are a little further along, although many of them are still operating first generation systems and have business processes for which they have paper system support. Some labs do not have an IT system and if they do, they often lack the interface that enables them to communicate data and collaborate with other labs and agencies.”

A second difference is the percentage of total organizational resources that are devoted to information systems. Private industry knows they cannot stay competitive without increasing resources and informatics investments on a regular basis. Public health's primary concern on the other hand remains the quality of health care delivered. Hence, private vendors constantly face the challenge of selling their IT solutions to organizations that would rather go for free software and funds committed to health care rather than information technologies. A third difference is the project approval and funding cycle. Corporate sponsorship vastly improves the chance of having a successful project in private industry.

Today's big question is whether CDC should invest more resources into development of complex, centralized data systems or maintain a central role in establishing data and communication protocols and standards, and redirect resources into state-based systems (Pezzino, 2003)? The dilemma arises from the fact that, even though the CDC insists on developing in-house software to be distributed for free, it has a reputation for being extremely late in its delivery. Plus, CDC provides only the software and does not take part in the training, support and maintenance of it. Since this has been going on for a while with relative success, we believe that the door to private vendors is opening due to their capacity to deliver and provide other much needed services.

When it comes to labs, the APHL brings up several issues regarding the parallel development of LRN and PHIN. First, the shared opinion among labs is that there is a need for greater understanding on how to use LRN messenger, along with its capacity and functions. It appears that there is lack of training and education on the functions of LRN, which slows down the IT development and consequently, compromises the

national objectives for public health reporting capacities. Medisolution's ability to provide a proven system along with full training and support would then be the solution to bring the LRN development up to speed! Second of all, there are deployment and resources problems to implement both PHIN and LRN due to limited budgets and ever-changing standards and procedures. There is a challenge of time, manpower and money in implementing all the nationwide standards and networks.

While CDC and others set up all these super-structures, not a lot is being done and creating and distributing implementation guides. The majority of agencies would appreciate having a list – or something else – to understand what needs to be done to be PHIN compatible and what IT choices possible (e.g. applications versus imposed standards)? Similarly, a road map should be set up to know what is the next step in the implementation.

Finally, a robust lab system is a pre-requisite to enable public health and private labs to move forward with LRN and PHIN. While private vendors can provide such system (e.g. MediLab), they are perceived as being very costly. The challenge therefore is to demonstrate that the funds committed to IT rather than care, will still benefit care down the road. A pure managerial/business approach in the sales process will not get the health professionals' attention.

A case study of Wisconsin's health network (Kratz, 2003) showed that the main challenge in integrated public health is getting local users to buy into a state-wide system with shared demographics, standardized fields/codes and of course, professionals doing data entry. As mentioned earlier, the problem also lies in the fact that local agencies

currently have limited access to the Internet, which limits their ability to participate in national networks.

According to CDC, public health wants two things from its IT providers (Bray, 2003). First, information technology should not drive the cart! The focus must remain on health care quality and availability and on supporting the public health mission. Second, the IT solutions should not be overly expensive since public health has limited resources to dedicate to IT development. For instance, the IT system or applications healthcare people will use every day should also be what they will use in the event of an emergency.

There is a need for common systems that can suit both state and local needs while creating value for everyone nationwide by reaching out to common goals.

To be successful, the public health people will have to seek the implementation of standards, routing procedures/transfer and communication protocols. For instance, for the labs, even low population states have more than 50 disparate sources of lab data (Glock, 2003). The three steps to a successful standard implementation would then be:

- To convert the disparate formats used by the majority of agencies into accepted HL7 version while keeping the ability to change them (the formats) if needed.
- To perform the translations with regard to semantics, vocabulary and the newly adopted coding standards (LOINC & SNOMED).
- De-identification of cases, which as mentioned earlier, is only scheduled to be address next year or so.

The fact remains that due to limited resources (funds, technology, people, time), the states need to plan carefully before implementing anything and make sure that all

member agencies understand the plan and endorse it. The collection and dissemination needs are driven at the local level but they have to be coordinated at the state-federal level to be successful in this integration endeavour.

4 MARKET ASSESSMENT OF PUBLIC HEALTH SYSTEM IN THE UNITED STATES

4.1 Public Health Monitoring System as the Cornerstone

Since the events of September 11, 2001, the Anthrax attacks and the emerging bioterrorism threats, more and more American began to talk about the urgent need to strengthen public health infrastructure. But “public health infrastructure” is a relatively vague and unfamiliar concept to most American people. What does it refer to?

As mentioned earlier, public health system is made up of a complex network of people, systems, and organizations working in the public (local, state, and national levels) and private arenas. Public health infrastructure can be understood as all the parts within the public health system that work to help health professionals carry out the ten essential public health services we addressed before. According to CDC, public health infrastructure has three core areas, namely Public Health Workforce, Information, Data, and Communication Systems, and Organizational & Systems Capacity. Information, Data, and Communication Systems, however, is well recognized the most basic part among the three. We can easily figure this out thorough its content:

Generally speaking, information, data, and communications systems are those elements of public health infrastructure that help public health professionals diagnose the health of populations, distribute resources to the right places, and alert the public to health issues. There are two integrated sub-systems within the main system:

➤ **Surveillance/Monitoring and Reporting System**

For epidemic and communicable diseases/hazardous, virus, effective surveillance/monitoring can prevent the outbreak that can debilitate an entire community/nation by rapidly identifying and then treating single or a few cases of disease. Therefore, surveillance / monitoring is one of the most important functions of the public health infrastructure, and the cornerstone of the new public health system.

➤ **Communications system**

Communications is linked to monitoring activities and crucial for the successful performance of public health's core functions and reporting activities. For efficient monitoring and responsiveness, government agencies involved in public health must be able to easily and quickly communicate internally as well as with other government and non-governmental agencies. Informing and advising the public about health promotion and disease prevention are also fundamental duties of public health agencies of all levels. Besides, communication technologies can also be used to seek the feedback and input of the population on the quality and perceived efficiency of the organizations and processes in public health (e.g. web-based forms).

4.2 Existing Monitoring Systems in U.S. Public Health System

Recognizing the importance of surveillance/monitoring for the success of public health, various U.S. government agencies have funded several medical IT projects or develop information systems to be used by all levels of public health (state, county, city, etc.). Private vendors are also present in this market. We have listed and categorized the most influential systems (public and private) as following:

➤ **Developed in-house by government public health agencies:**

1. **The Public Health Information Network (PHIN)** - PHIN supports unified public health information and communications system for public health labs, the clinical community, and state and local health departments. PHIN works to define data and vocabulary standards and strong collaborative relationships that will enable consistent exchange of response, health, and disease tracking between public health partners. PHIN is composed of five key components: detection and monitoring, data analysis, knowledge management, alerting and response. PHIN serves mostly as a network to provide CDC with input of national health status. Local databases and systems at CDC can analyze and produce reports, hence eliminating the need for private monitoring applications at this level of the public health structure.

2. **Information Network for Public Health Officials (INPHO)** - INPHO aims at increasing the effectiveness of public health practice by linking professionals with the necessary information needed to identify health dangers, implement prevention and health promotion strategies, and evaluate health program effectiveness. INPHO computer networks and software link local clinics, state and federal health agencies, hospitals, managed care organizations, and other providers.

➤ **Funded by government agencies but developed by private contractors:**

1. **Registry of State-Level Efforts to Integrate Health Information** - Recognizing that states are developing innovative information systems to support the evolving role of state government in the health care system, the U.S.

Department of Health and Human Services contracted with The Lewin Group to identify state-level health information integration projects and develop a descriptive registry of these efforts. The registry provides Federal policymakers with a central source for researching the types of integration activities states are pursuing. The registry also, through dissemination on the Internet, aims to facilitate communication among states regarding data integration initiatives and related data policy activities.

2. **CDC's Enhanced Surveillance Project (ESP)** - CDC is working with state and local health departments and information system contractors to develop real-time special event syndrome surveillance and analytical methods. During special events, ESP monitor sentinel hospital emergency department visit data to establish syndrome baseline and threshold. Aberration detection models developed and analyzed at CDC identify deviations in visit data and report to state and local health departments for confirmation and appropriate epidemiological follow-up.

➤ **Fully developed by private sector but adopted by government agencies:**

Currently, numerous information technology companies in the U.S. are developing distinctive systems to meet increasing demand in public health market. But for some reasons (explained in a subsequent section), none of these companies has successfully persuaded federal and state government agencies to adopt their products. The time allotted for this study also did not permit a thorough analysis of the competitors present in all levels of the public health structure.

4.3 Factors Preventing Private IT Firms from Entering the Industry

Basing on the analysis of U.S. healthcare system, especially the structure and characteristics, we have identified several factors making it more difficult for private IT companies entering the industry:

4.3.1 Lack of Industry Standard

This might be the main difficulty facing IT companies interested in developing public health information monitoring systems. Currently, there are many systems that support communications but they often operate in isolation and do not have the potential of data exchange. There is no federal-level unified industry standard for such a system. Some states have adopted their own standards, but the majority still have no standard or in processing it. Such lack of unified industry standard usually makes IT companies feel frustrated since neither can they follow one existing standard, nor can create a standard and then convince the government agencies to adopt it. Existing standards are always subject to change; a new standard is no more than a gambling. However, there are federal agencies dealing with the technical standard used in public health industry – NAPHIT and ANSI which we have introduced earlier. Before the government adopts a certain information technology standard used in healthcare industry, the government usually works closely with NAPHIT and ANSI to make decisions.

4.3.2 Decentralized and Highly Privatized Healthcare System

Given the fact that U.S. has a decentralized and highly privatized healthcare system, different players in this system are driven by various interests.

The commercial hospitals and labs would be important users of monitoring (and lab) applications, but economic interests mostly driving these institutions may interfere with investments in technology to benefit the population more than the organization. In other words, a population tracking system would add their operation cost, but may not necessarily promote their economic return. It's really hard to imagine these commercial organizations purchase the system voluntarily.

Yet, government agencies hold their commitment to the society and are willing to introduce new information technologies to enhance the quality of their services. But the agencies at different administration levels, namely federal, states, municipals and counties may have different considerations while facing various demographic situations. How to address these different considerations would be a challenge to IT companies.

4.3.3 Emergence of Potential Leading Public Health Monitoring System

Some existing public health information system is planning to expand its usage to nationwide. The most ambitious one is CDC's Enhanced Surveillance Project (ESP), which we mentioned before. ESP has been tested at the World Trade Organization Ministerial in Seattle, the Republican and Democratic National Conventions held in Philadelphia and Los Angeles, respectively, and the Super Bowl / Gasparilla Festival in Tampa, Florida. CDC will continue development and evaluation of ESP, in order to provide guidance and resources to state and local health departments for implementation of local real-time surveillance systems. We believed that there are some other similar systems that are also ready to compete nationwide.

Apparently, these existing systems are potential competitors of Medisolution's products. In order to cope with this competitive market, Medisolution may have to advertise its own comparative advantages to achieve proper positioning for its own products.

4.3.4 A Highly Demanding Market

There is no doubt that market for public health information monitoring system is a highly demanding one. But as demonstrated so far, the interest for buying a solution from a private vendor may not be there as much as we would like it to be.

An ideal information system have to meet following requirements: communicate health information and messages to the public and media effectively; develop and maintain a national health tracking network; have the ability to share data across agencies and organizations (uniform standards for collecting, storing, and transmitting data); and increase, or make better use of, funding for the development of comprehensive data systems and communications capacity. Obviously, it requires the developer not only have access to the specialists, expertise, and necessary capital, but own comprehensive connections with different government agencies and private sectors involving in healthcare to obtain data and information for developing the product.

Secondly, new entrants are facing the problem of how to pass the competition of existing government contractors. Several private IT contractors have already established relationship with government agencies and use their impressive work to consolidate the relationship to win further contracts from the government. The Lewin Group is a representative one; it has been with leading government agencies involving in public

health for several years. For the new comers like Medisolution, competing with these contractors to penetrate the market is relatively difficult. But Medisolution can try to establish strategic alliances with these leading contractors to take advantage of their connections with the government. By doing so, Medisolution may have the opportunity to achieve immediate presence of its products in U.S. market.

Last, how to leverage different interest groups to locate buyers and payers can be another challenge to potential entrants. As we discussed before, U.S. healthcare system is unique and how to figure out potential buyer and payer is extremely important.

4.4 Opportunities for This Market

4.4.1 Urgent Need to Strength the Public Health Information System

Some recent events such as Anthrax attacks, fears of bioterrorism, West Nile virus and SARS, make a strengthening public health information system more and more compelling and in urgent needs. Some American politicians have even recognized public health as a unique part of homeland defence. Such a sentiment is really in favour of the development of public health information system.

4.4.2 The Development of Information Technology

Thanks to the rapid development of information technology, most clinical care in U.S. had become computerized, which directly increase the possibility of further informationalized these institutions by adopting public health information monitoring system.

4.4.3 Emerging of Unified Industry Standards

CDC as the leading federal public health agency was aware of the importance and urgency of having a unified industry standard within national wide and gradually worked on it. Meanwhile, some other related interest group also began to make effort to introduce a unified industry standard:

1. CDC's Health Information and Surveillance Systems Board - This CDC Board was created in 1996 in response to the recognized need for an integrated public health information and surveillance system. The Information and Surveillance Systems Board provides an on-going framework for CDC's Agency for Toxic Substances Disease Registry to exert leadership in the integration of public health information systems. It works to form and enact policy that would support information and surveillance systems.
2. National Electronic Disease Surveillance System (NEDSS). The National Electronic Disease Surveillance System (NEDSS) is an initiative that promotes the use of data and information system standards to advance the development of efficient, integrated, and interoperable surveillance systems at federal, state and local levels. It is a major component of the Public Health Information Network (PHIN).
3. The National Association of Health Data Organizations' (NAHDO) Health Information Dissemination System Clearinghouse. This clearinghouse serves to improve state health information and data dissemination strategies; promote national convergence of health data use and dissemination methodologies, tools,

and standards and; link the users and the developers of web-based data dissemination systems to assist the transfer of knowledge and technologies.

The U.S. government is working hard to adopt nation-wide standards in all aspects of public health, which will facilitate product development and adjustment for private vendors. It is expected that national standards will be defined in the next couple of years and the implementation and integration of these would take an additional 3-4 years.

5 RECOMMENDATIONS FOR MEDISOLUTION

As highlighted throughout the analysis of the U.S. market and public health structure, there are two sides to the story. In further assessing the potential of the public health market for its products, Medisolution will need to work on two sides: the government (Section 3 of the report) and the potential clients (Section 4 of the report). The underlying reason is that while health authorities and entities (e.g. hospitals, labs, clinics) represent the potential buyers, the decisions for IT strategies and development and the consequent budgets are the responsibility of the government and the non-for-profit national health organizations. Our recommendations hence are developed around these two axes and will provide advice and suggestions on how to operate in these two interrelated areas.

5.1 Government Side: Building a Reputation

In any international market assessment plan, it is important for a firm to understand the current situation and identify the key decision-makers to better anticipate what is coming for the next decade and be a step ahead in strategic planning. In Section 3, we identify the key organizations and explained their role and responsibilities. These organizations influence the evolution of the public health sector through policies, allocated budgets and contract allocation regulations. Finally, the particular circumstances around any private-public sector commercial partnerships also highlight the importance for a firm to be on the government's "good side".

5.1.1 Policies and Government Stakeholders

As mentioned before, the public health sector (when it comes to human patients rather than restaurant hygiene for instance) is still in a transition phase. While the government and its agencies seem to have a good idea of the structure they want to have in place, many aspects of it have yet to be fully implemented. Therefore, we would advise any company not to base their strategic decisions solely on the current situation since it is expected to change again. A good example in U.S. public health is the government's attempt to implement LITS (Lab Information Technology System), a system that was meant to link all U.S. labs to CDC for disease and medical reporting. The efforts and budgets spent on LITS did force many organizations to adopt this communication system. However, down the road, the plan proved to be a failure. CDC was not able to deliver the different modules in time and provide the technical support for proper implementation. While some local agencies are trying to revive the project, we doubt it is going to happen. This highlights the importance for Medisolution to keep an eye on the policies being implemented, the decisions made at the federal and state levels and the standards being adopted.

To do so, the company does not require a lot of time and resources. Considering the size of Medisolution's business in the United States, we do not believe to be advisable that the company hires a person solely to keep track of government initiatives as it is done in Canada. At the moment, current managers in place can handle this task to a lesser extent. Most of the information at this point can be collected through various means. The easiest and most cost-effective way is through the Internet. The focus needs to be on the key decision-makers: HHS, CDC, NACCHO, ASTHO and APHL. The first two are the

ones the trendsetters and the budget providers. The other three are the organizations heading respectively the local, state and public health agencies.

The monitoring activities should begin with the Department of Health and Human Science (HHS). For what matters here, HHS is the primary responsible of all plans for the integration of information technologies in healthcare to achieve population health tracking and monitoring, the efficiency of public health agencies, bioterrorism preparedness and disease control and prevention (e.g. SARS, AIDS, West Nile Virus). The HHS website provides valuable information on national standards, federal bills and policies being adopted as well as on the inherent budgets to support such activities. Although it is always preferable to have timely information, it is acceptable to rely at this point solely on what is being published on the website. Indeed, all published decisions usually take several months to be implemented, which gives ample time to a company to react. HHS is also the main source of information when it comes to government decisions on healthcare. With the Bush administration much focused on public health and bioterrorism preparedness, many initiatives currently come from the government level rather than HHS itself. A last word on the policies involves standards. HHS in the past has been the champion of the adoption of HL7 as a communication standard and was also the driving force behind HIPAA that framed the guidelines for security and medical information sharing. In implementing a system like MediPatient+ for population monitoring and tracking, the levels of access to the data and the types of information sharing will have to be determined in way that they comply with the HIPAA regulations. However, the example of the HL7 standards did not affect Medisolution since Canada

also adopted HL7 and hence, all existing Canadian versions of the firm's software already comply.

In the future, HHS policies can have all sorts of impact on Medisolution's operations. Right now, there are discussions within healthcare to adopt ICD-10 (the tenth version of the International Statistical Classification of Diseases and Related Health Problems), which would bring the U.S. up to speed with the other modern, Western healthcare systems. Medisolution's applications are currently designed for ICD-10, the system used in Canada. The adoption of ICD-10 in the U.S. would mean a less costly adaptation of Canadian versions to suit the U.S. market.

The website of CDC is a true goldmine for information on public health trends and with reason. The public health authorities soon realized that the cornerstone of an efficient response system starts with the public health laboratories (Source: IT Needs of CDC for Lab Response (BT Case)). The mandate to develop the public health lab structure and improve its IT level was given to CDC along with the required budgets. CDC is the main shaper of the public health system through systems like NEDSS and PHIN. The implementation of their Messaging System for reporting is supported through major investments. However, the latest news posted shows a change of direction. CDC's history of late delivery of information systems and its limitations when it comes to providing training and technical support have lead CDC to refocus its strategy on national network communication interfaces only (Pezzino, 2003). This change in policies and strategies seems to open the door for IT vendors to provide healthcare agencies with local IT applications. For the more technical aspects, Medisolution can keep an eye on the TA/TDA department of CDC (Technical and Direct Assistance). They help the public

health partners in the development of their IT systems within a national public health information network. Mr. Jay Schindler, the program manager, is the key person here. Questions regarding technical requirements for application PHIN compliance could be addressed to this department. Their work and decisions are published on CDC's website.

Dealing with governmental agencies is somewhat different from dealing with privately owned enterprises. Within a governmental system, the buyers and the key decision-makers are often not within the same organization structure. While the buyers do have a discretionary supplier-selection and purchasing power, the policies and decisions serving as guidelines for such decisions usually come from the federal level. In such context – and this is not exclusive to the United States – it is critical to be somehow connected to the government, its federal agencies and key officials. Medisolution should therefore spend time and efforts developing its relationship with the government's top agencies, lobby its products and services and build up its reputation as a dependable IT supplier for the U.S. healthcare market. There is no need to look very far to find evidence of the usefulness of such strategy. In the case of the blood-bank management system contract for the province of Quebec (Canada), Medisolution's biggest contract ever, the involvement of key consultants and employees to leverage connections with the government directly contributed to not losing the contract in times of conflict and ultimately, making it a successful experience. The professional handling of the problems and the overall success of the implementation established Medisolution's reputation more than ever as a top quality supplier for high levels of government healthcare activities.

Medisolution's strategy should involve lobbying its products and services to the NACCHO, ASTHO and APHL organizations. Local healthcare agencies and labs are

given funds to improve their IT systems. These funds are usually spent on hardware and getting Internet access since these purchasing decisions are easy to make. The IT applications, while much needed, are relegated to the second rank in priorities. The agencies understand the emergency of improving their infrastructure and then go down the easiest way first, hardware. Still, the Laboratory Information Management Systems (LIMS) for most states and counties need to be upgraded or replaced. In this regard, recent steps have been taken to determine the level of commonality between public health lab requirements in order to address their information technology needs in an efficient and economical way (APHL – PHIN Summary). The bids for IT systems are currently managed by the agencies (e.g. the state public health labs altogether), but the vendor selection is often made in collaboration with the state and the corresponding organization (NACCHO, ASTHO and APHL). Medisolution, while going after the bids, would gain from properly promoting itself to these organizations since they often are the reference used by local agencies for vendor selection. Medisolution has to promote its capabilities to simplify this complex IT improvement process by demonstrating its versatility. Unlike CDC, Medisolution, as a private specialized vendor, is able to provide consulting, training and technical support services. It can provide both software and hardware through a fully integrated implementation on-site. While all of this involves additional costs for local agencies (compared to federal free software), we feel they would see the much compensating benefits and added value of going with a private vendor. Plus, Medisolution possesses a good understanding of the underlying challenges of data entry and data management by healthcare professionals. Its processes and applications are more

adapted than the ones of national organizations (e.g. CDC's applications) and closer to their needs and day-to-day reality.

Similarly, those three national organizations get IT advice from NAPHIT. As mentioned before, NAPHIT is there to assist its members in the evaluation, selection and implementation of information technology in the public health sector. In the previous situation, Medisolution had to promote its business and best practice competencies. With NAPHIT, the company should promote its technical competency and R&D potential and hence establish its credibility in the eyes of the IT experts of the healthcare system.

Lobbying activities can be done in many ways and Medisolution's experienced employees know better how to do this than we do. Promotion can be achieved by sending promotional tools to key people in those organizations and building relationships by sending representatives to meet with these key decision-makers. Another way is by ensuring Medisolution's presence and exposure at national public health events such as the national PHIN two-week conference, held at the beginning of the summer in Atlanta. These national events provide amazing opportunities to meet all public health stakeholders in one single location, promote the competencies of the firm, look for partners and become involved in the shaping of the public health IT structure.

5.1.2 Budgets and Contract Allocation Regulations

Where is the money? Where is it going? The HHS, the organization responsible for primary funding, does give a breakdown of the public health budget on its website allowing companies to identify where the money is going, to whom and for what purpose.

CDC's Direct Assistance (DA) department is one key player in budget allocation. DA in public health is responsible for the attribution of the Bioterrorism Cooperative Agreement Funds for services, contracts and equipment. Public health agencies work closely with DA to evaluate their IT needs for PHIN compliance and write a Statement of Work (SOW). Once CDC receives the SOW, CDC obtains quotes through federal contract vehicles. The process for the equipment and software purchases usually takes from 14 to 45 days. The contract vehicles for DA are: GSA Contracting, CITS Contracting and Direct Contracting. The GSA Certification is relatively important in order to be recognized by the government as a dependable – and consequently preferred – supplier for public organizations. Right now, Medisolution uses the GSA certification of a consulting firm for its bids. While this may represent the ideal strategy at this point, we recommend that Medisolution the possibility of either a getting solid, stable partnership with the consulting firm or their own certification. While the latter represents additional costs, it does provide the company with more autonomy and less dependence on its partners when it comes to bidding for contracts. Due to lack of information on the company and on the GSA certification requirements (only available to businesses), we were not able to conduct any cost-benefit analysis for Medisolution regarding this matter.

5.2 Market side: Finding Potential Clients

Besides developing or further improving the relation with those government agencies in charge of public health industry, Medisolution should work on locating potential clients simultaneously. Basing on the market analysis, we can conclude that U.S. public health system is a decentralized and multi-level one. In regarding to public health monitoring system, various public health surveillance systems and reporting systems

developed within different levels from federal to states, to county, and to city are implemented in the country. Furthermore, we cannot see any clear clue indicating that any particular system will replace the others and become the dominating one in a short term. Therefore, we will screen necessary information from level to level to figure out from where and by how Medisolution can penetrate the market and locate potential clients.

5.2.1 Potential Clients at Federal level

CDC is the most important or dominating player in public health industry in the federal level. It seems CDC is the only choice for Medisolution to target at this level. But as we mentioned before, in regarding to the public health surveillance and analysis system, CDC already has its own product and only accept in-house developed system. On the other hand, Medisolution's products, MediPatient+ and MediLab, are specially designed for local agencies like hospitals and various laboratories that are at the front end facing the targets being monitored.

Given these consideration we do not think Medisolution can locate any potential buyer for its products at federal level. But this does not mean Medisolution can do nothing at this level. As what we have discussed in the earlier section, Medisolution should keep an eye on the money movement at federal level. As a matter of fact, a big portion of budget from the congress and national health department for the purpose of improving public health standard is allocated to CDC which will later grant the money to the states or organizations needing financial resources to fulfill their public health commitments. If Medisolution can learn the information about who CDC has granted that money, it may have a better chance to locate potential buyers: in a lot of cases, the grant

from CDC is used by states or organizations to establish or upgrade public health surveillance system – nowadays people are trying hard to prevent the happening or wide-spreading of SARS, West Nile, or similar events.

5.2.2 Potential Clients at State Level

Basing on the analysis of U.S. public health structure, we suggest that Medisolution's marketing operation should vary with the products.

In the earlier part of this paper we have indicated that the government agencies in charge of public health at the state level does not hold any particular patient's health records, instead they just collect some basic demographic data for public health purpose. In another word, government agencies in charge of public health at the state level does not need a surveillance system like Medisolution's MediPatient+ which was designed to collect and monitor individual patient's detailed health records. Therefore, Medisolution's sales forces should avoid spending time and money promoting MediPatient+ at this level.

On the other hand, MediLab, another product of Medisolution may have a better sales perspective at state level. There are several public health laboratories in each state. State health department directly supervises the operation of these public labs and grant budget to labs to purchase equipment or support technical upgrading. In an explicit word, the health department in each state has a direct and overwhelming influence on the purchasing decision of those public labs within the state. So Medisolution's sales forces can penetrate the market by approaching the health department in each state where there is a public laboratory director in charge of all the public labs within the state.

Medisolution sales staffs then can demonstrate the company's product and learn specific information about bid for public health surveillance system used by public labs.

In regard with identifying which states Medisolution should approach now, there are two different ways:

First, screen the information released by CDC or national health department to figure out the development stage of public health surveillance system and decide the contacting list accordingly. For instance, currently there are about 21 states (See Appendix 10) have participated a CDC-funded public health surveillance system, which means Medisolution should accelerate its marketing penetration in these states, because the hospitals and labs within these states might be required to possess a monitoring and tracking system to fulfill public health surveillance task within the state. In another words, the hospitals and labs in these states already have the commitment to buy a monitoring system. Also, there was evidence showing that among these 21 states, Wisconsin was the only one that has well established a public health surveillance system. The rest are still in planning or preparing stage. Bearing this information in mind, Medisolution's sales forces should give up contact Wisconsin, instead try the others.

Second, Medisolution can analyze the latest hospital preparedness budget situation to prioritize its contacting list. For instance, by analyzing the 2004 Budget for Hospital Preparedness (Appendix 5), we can conclude that some states like New York State, Texas, and L.A. etc., have much more financial resources to pursue the establishing of public health surveillance system. Therefore, the company's sales forces can consider invest more time and money in these states to foster the market.

5.2.3 Potential Clients at County and City Level

Comparing to federal and state level, county and city level are the places that Medisolution sales forces should focus on and spend more time and money. The reason for this is that government agency in charge of public health at county/city level regulate the operation of all the hospitals and various labs except public labs within the jurisdictions. Since these county/city level health departments can direct affect hospitals and labs' purchasing decision, we suggest Medisolution sales forces follow a two-steps procedure:

First, develop a contacting list by screening the density of the population of each county in the U.S. The counties / cities with higher population density should be in the top of the list. The rational is that these counties / cities are in more urgent need for a public health surveillance system to prevent the widespread of undesired disease.

Second, following the contact list the company's sales forces approach the health department in these counties / cities to promote products and learn information about relating bids, etc. By doing so, Medisolution can locate numerous potential clients.

6 CONCLUSION

Having introduced the structure of U.S. health care and public health surveillance industry, identified major players in this industry and then analyzed the market situation from Medisolution's perspective, we have given out our market entry plan for Medisolution's two products in U.S. market. Yet, there is a long way for Medisolution to go in this market. There are still some concerns imperiling Medisolution's operation in U.S. market like undecided industry standard, the relationship with local competitor and potential request of customizing its products to cope with specified customers, etc. The company should be cautious of these issues and prepare to solve them in a creative way. This might be the only way to survive and thrive in a demanding market like the United States.

Besides, as highlighted at the beginning of this project, further research is required to truly assess the business potential of this market segment since many questions remain unanswered. The next step would be focus on business aspects such as pricing, technical aspects and certifications. While this study provides leads as to where the market is, it does not say whether the current prices of Medisolution's products and services are too high or too low (like their initial pricing strategy for Ontario, based on the Quebec prices) for the market. We also do not provide much information on technical aspects pertaining to how American practitioners use information technologies. They do after all more data entry for billing than their Canadian counterparts. In other words, different processes may require different interface and features. Also, further research

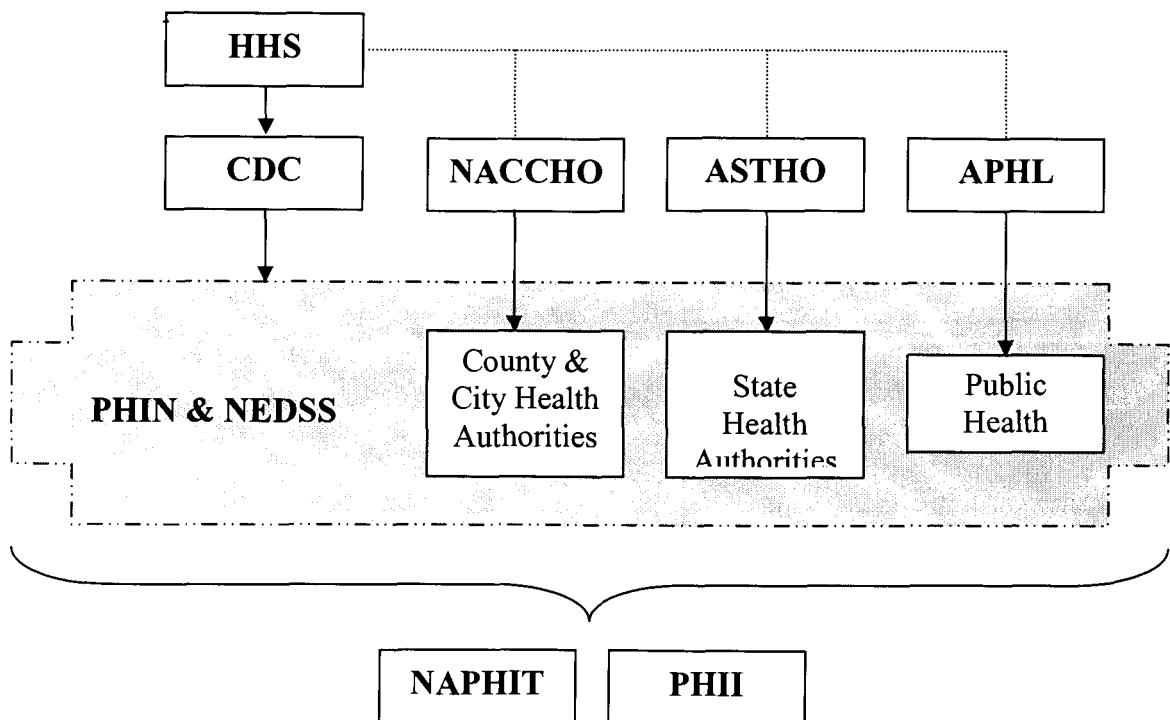
should verify if any product introduced in this market needs specific approval from federal agencies or national certifications in order to be legally distributed. Finally, more information should be gathered on the competition. This business intelligence was hard to get in the short time allotted for this project. Nonetheless, it would prove useful in targeting the right states and counties to start entering this market segment. As we know, several states and counties have either opted for CDC-developed systems and platforms (NBS and others) or signed with universities and/or private vendors to developed their own systems. Still, a vast majority of jurisdictions have not yet chosen any of the two options, mostly because the funding requests are still pending. The focus should be on monitoring closely these jurisdictions and be the first mover upon the announcement of the bids. Lobbying and promotion of the products and services can be done with key government agencies in the mean time, to build awareness and a reputation for Medisolution. We are conscious that this study only gives an overview of the situation of the market but we hope it will be useful as a basis for further, more detailed and focused research on public health business opportunities in the United States.

APPENDICES

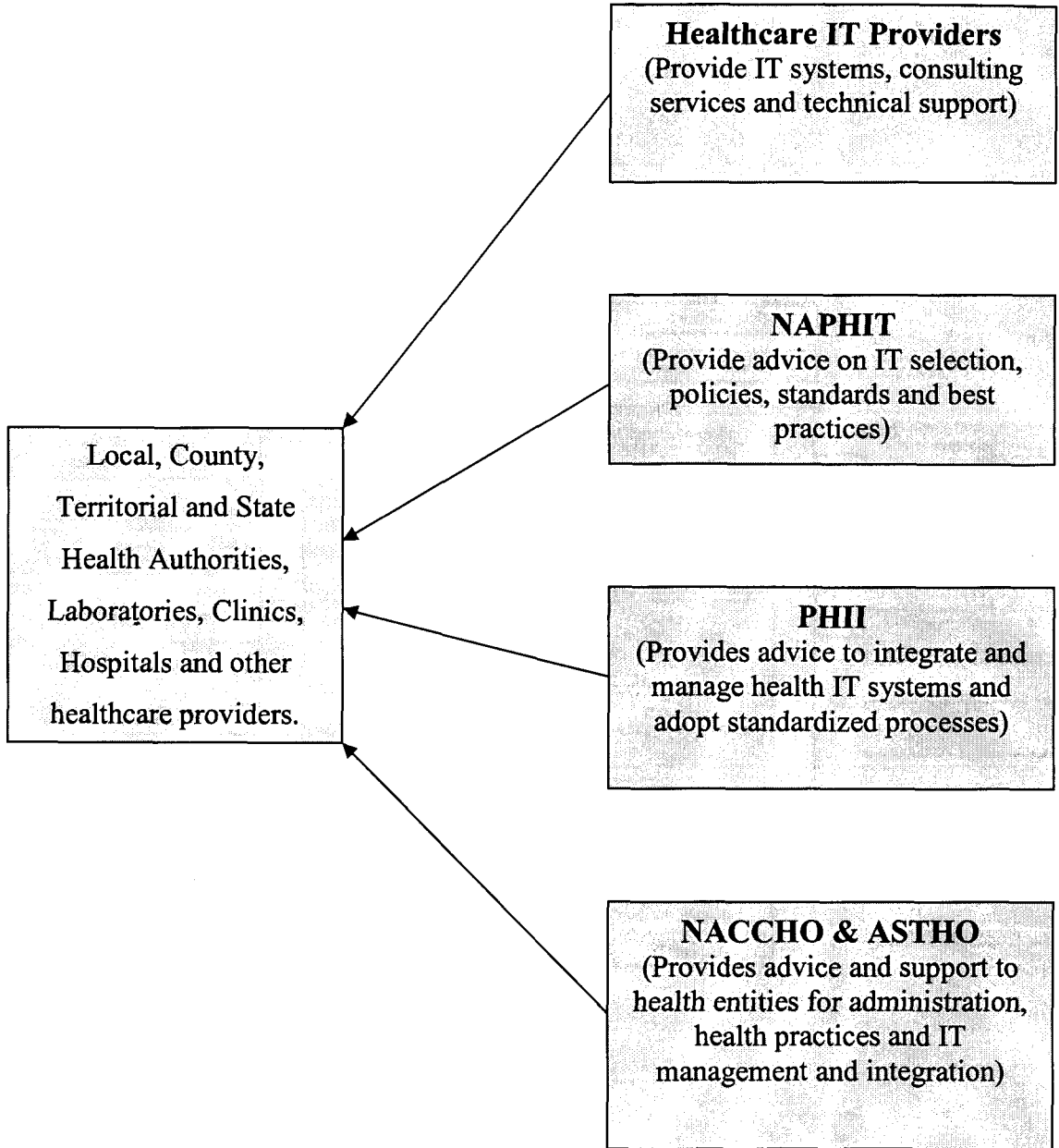
Appendix 1: U.S. Public Health Structure & Interactions

Key players involved in public health in the United States.

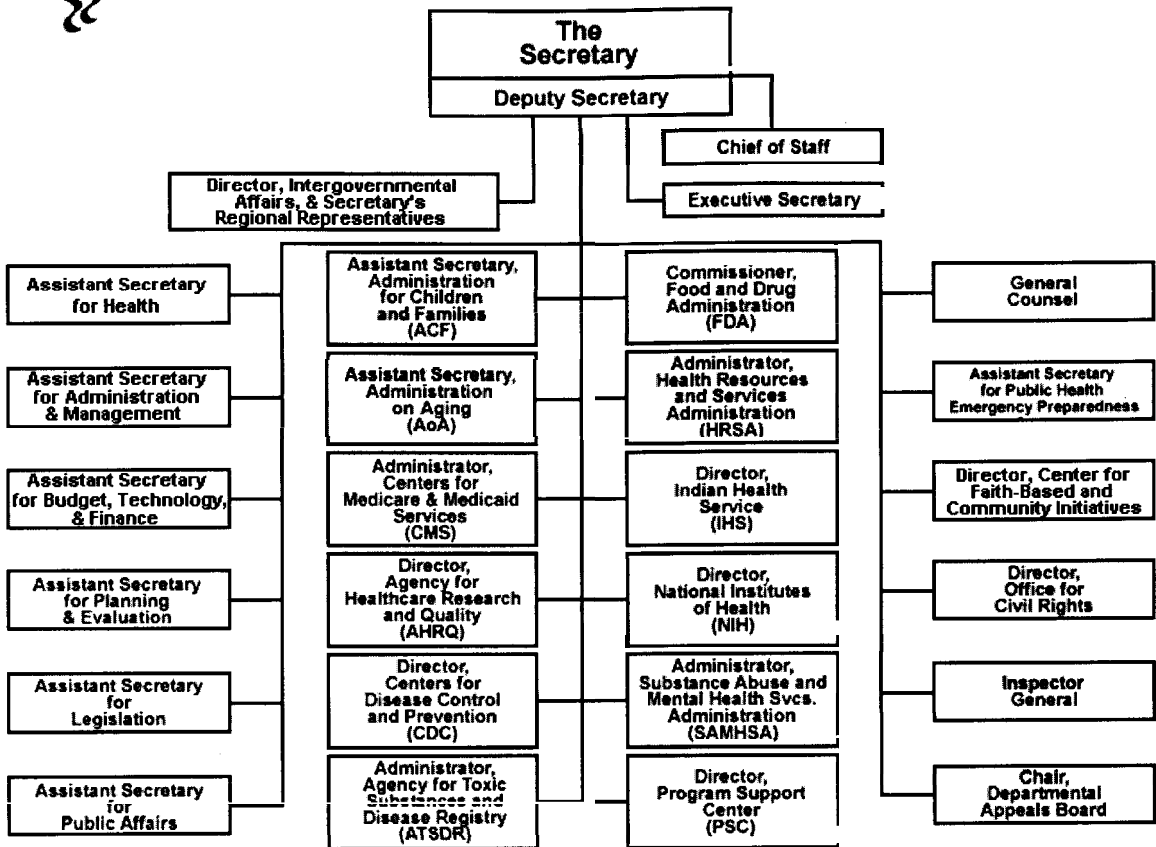
- HHS is the hierarchical superior of CDC and has an indirect influence on NACCHO, ASTHO and APHL through its policies.
- NACCHO is responsible for the county and city health authorities.
- ASTHO is responsible for the state and territorial health authorities.
- APHL is responsible for the state public health laboratories.
- NAPHIT and PHII are independent from the Department of Health and Human Sciences (HHS) and affect all levels of the public health system through IT advising and other related IT activities.
- PHIN and NEDSS are managed by CDC and include all healthcare entities.



Influences organizations have on the healthcare entities.



Appendix 2: HHS Organizational Chart



Source: <http://www.hhs.gov/about/orgchart.html>

Appendix 3: NAPHIT Strategic Plan 2004-2007

1. Current public health environment: Key time for public health information and infrastructure development.

Current focus on preparedness and response has highlighted the need for strengthening the country's public health infrastructure. NAPHIT can take advantage of this current climate through goals related to the following strategies:

- Promote standards in data modelling, messaging, architecture and strategic planning.
- Promote IT solution and best practice sharing and funding for IT development, maintenance and support.
- Promote PHIN architecture and standards.
- Devise collaborative IT solutions for public health for program management and evaluation as well as preparedness and response activities.
- Increase awareness of the important role that IT professionals play in supporting public health.

2. Advocacy: Impact of legislation on data sharing to support core functions of public health.

NAPHIT strategies to address legislation on data sharing include:

- Advocate for legislation and agreements at the federal, state and local levels that support public health yet protect the individual's privacy by allowing for the capability to share appropriate levels of health data across borders and between programs.
- Leverage collective voice of NAPHIT members related to IT solutions and/or policies that can be adopted nationally.
- Educate members about using best practices on key issues.
- Ensure NAPHIT representation on national IT committees and organizations.

3. Organization Development: Developing a viable professional organization.

Building NAPHIT into a credible association is critical to its future and to the achievement of its vision and goals. Strategies include the following:

- Expand NAPHIT membership base through a membership campaign.
- Build strong partnerships with key public health organizations by developing a strategic vision and agenda for collaboration.
- Ensure ongoing support of the Public Health Informatics Institute through collaboration and coordination of NAPHIT activities supporting that organization's work.
- Secure support for NAPHIT from corporations, foundations and other business organizations.
- Ensure staffing appropriate to meeting the needs of the organization.
- Secure non-profit status for the organization through affiliation with an organization that supports the vision and mission of NAPHIT.

Strategic Goals and Objectives

NAPHIT's goals and objectives are divided into two categories: program-oriented goals and management goals.

PROGRAM Goals and Objectives

Goal	Objectives
1. To promote and advocate for public health IT architecture standards of practice.	1.1. Promote PHIN architecture and standards by collaborating with CDC and the vendor community. 1.2. Develop and implement a system for collecting and sharing best practices. 1.3. Provide NAPHIT member input on PHIN readiness. 1.4. Identify other information systems at the local level that fit into the broader public health IT picture.
2. To advocate for universal data sharing capability through legislation, policy development and public information.	2.1. Collaborate with ASTHO, NACCHO and other organizations to enhance efforts at the federal, state and local levels to change and/or secure legislation that reduces barriers to data sharing. 2.2. Secure NAPHIT representation on national IT committees. 2.3. Leverage the collective voice of NAPHIT members on national discussions and debates related to IT solutions and/or policies. 2.4. Secure NAPHIT participation at national conferences and meetings to speak on key policy issues. 2.5. Use the collective experience and resources of NAPHIT members to educate, promote, and share successful and sustainable IT strategies and solutions. 2.6. Be seen as the voice of public health IT by CDC, HRSA and other federal partners, so as to be heard on policy and legislative issues.
3. To build stronger partnerships with and between public health associations, vendors, institutions and agencies	3.1. Through IT collaboration, cooperation and standards, advance the integration of public health systems and the ability to share IT solutions amongst public health partners. 3.2. Facilitate communication between those who are developing, administering and maintaining public health information technology. 3.3. Develop effective, mutually beneficial partnerships with other public health associations that have an interest in public health IT, including ASTHO, NACCHO, and their affiliates, and also with APHA and the Public Health Data Standards Consortium. 3.4. Improve the integration and security of IT systems in order to provide public health with quality information in a timely and cost effective manner through collaboration and coordination of activities with key federal partner organizations
4. To collaborate with agencies and organizations on activities that further the NAPHIT vision and mission	4.1. Collaborate with CDC on the development of a survey to assess current readiness for PHIN. 4.2. Use NAPHIT communication mechanisms, annual meeting and other national forums to promote PHIN and other appropriate architectures and standards. 4.3. Provide input and resources to the Public Health Informatics Institute for the identification and development of public health IT leadership development workshops and seminars.

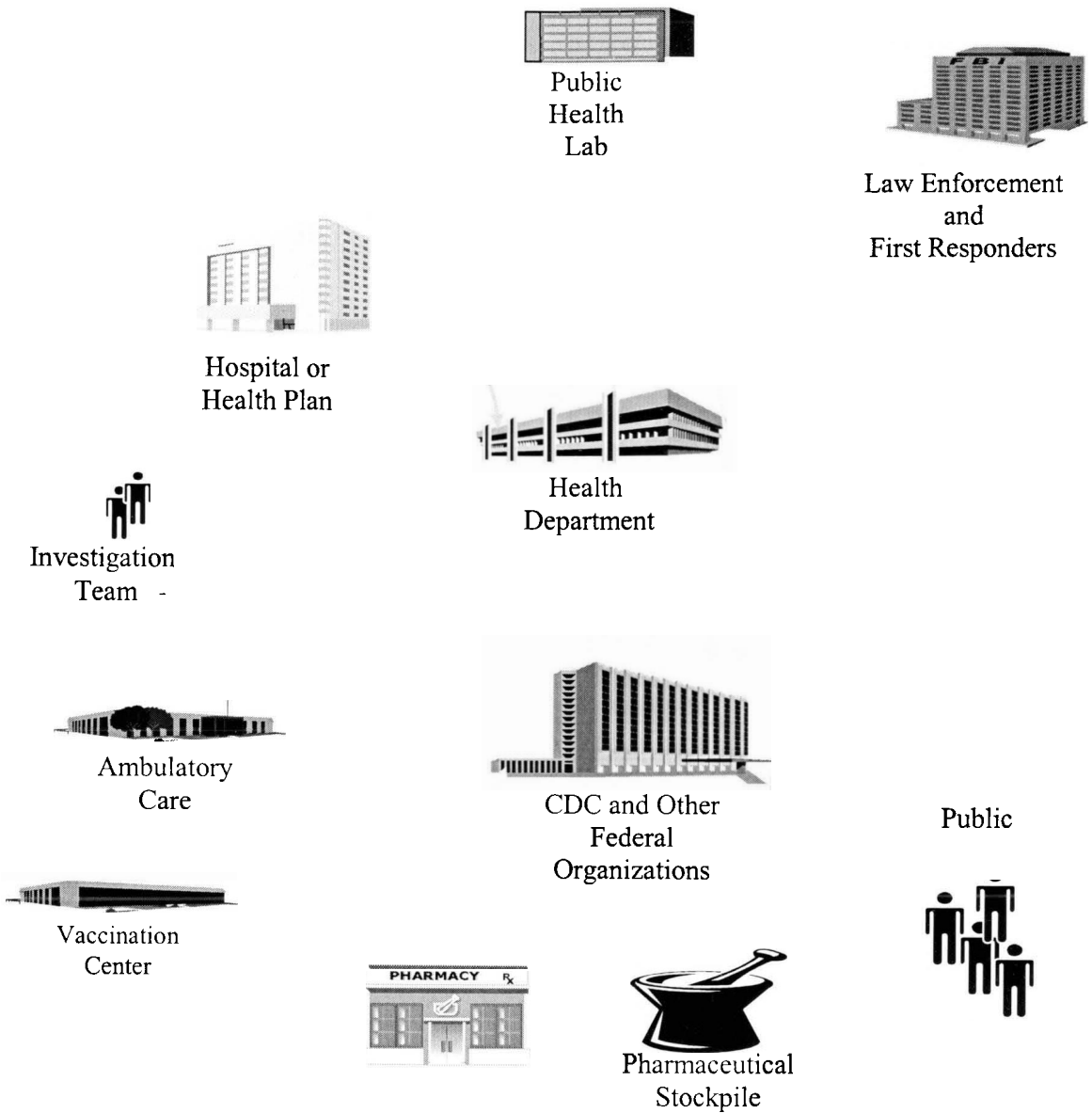
Goal	Objectives
<p>5. To contribute to the leadership development of public health IT professionals</p>	<ul style="list-style-type: none"> 5.1. Ensure NAPHIT representation at all major public health meetings and conferences and where appropriate, sponsorship of meetings. 5.2. Provide a forum for the exchange of ideas, information and experience of public health information technology professionals. 5.3. Be the professional organization of choice for information technology leaders and staff in the public health field by collecting and sharing public health IT knowledge and best practices. 5.4. Provide a consultation service for public health IT challenges. 5.5. Conduct meetings or use other communications mechanisms to facilitate the sharing of public health IT best practices. 5.6. Produce a newsletter for wide distribution. 5.7. Expand current web site to facilitate the archiving and sharing of best practices and other IT information.
<p>6. To promote strategic management of information technology in public health organizations</p>	<ul style="list-style-type: none"> 6.1 Promote the development of IT strategic plans, driven by organizational goals and objectives. 6.2 Advocate for the development of enterprise architecture plans at the local level. 6.3 Promote the leveraging of resources across a network of local health departments. 6.4 Facilitate the identification of resources to fund IT projects. 6.5 Promote process improvement focus.

MANAGEMENT Goals and Objectives

Goal	Objectives
<p>1. To secure stable financial resources to support NAPHIT's organizational development.</p>	<p>1.1 In the next 3-5 years, raise at least 95% of NAPHIT's annual operating budget through a diversified approach to include corporations, foundations and business organizations.</p> <p>1.2 Implement a process for the solicitation and collection of membership dues, so within the next 3 to 5 years approximately 5% of NAPHIT's operating budget will reflect dues collected.</p> <p>1.3 Explore and secure in-kind donations to help support NAPHIT activities.</p> <p>1.4 Establish annual meeting, conference and other NAPHIT meeting fees.</p>
<p>2. To maintain qualified staff for all NAPHIT services and activities.</p>	<p>2.1 Secure funding to support the Executive Director as a fulltime staff to provide ongoing organization infrastructure development, support to the Executive Committee and coordination of NAPHIT activities.</p> <p>2.2 Increase the number of staff to a minimum of two (2) to support NAPHIT's ability to provide advocacy, education, policy development and knowledge sharing services on behalf of its members.</p>
<p>3. To maintain an active and informed leadership team of elected, volunteer association officers to carry out the governance role</p>	<p>3.1 Keep all Executive Committee and member-at-large positions filled with active participants.</p> <p>3.2 Include diversity on the leadership team to reflect the NAPHIT membership.</p> <p>3.3 Establish a NAPHIT committee structure to promote broad input and member participation in the association's activities supporting the accomplishment of its mission and goals.</p> <p>3.4 Ensure ongoing communication through the coordination of monthly conference call meetings and in-person meetings at national conferences and meetings.</p>
<p>4. To increase the visibility and awareness of NAPHIT as a professional association</p>	<p>4.1 Produce and distribute an electronic newsletter bi-annually.</p> <p>4.2 Expand NAPHIT web site to serve as an effective, interactive and informative communications mechanism for its members.</p> <p>4.3 Convene an annual meeting that highlights the work of NAPHIT and best practices of its members.</p> <p>4.4 Develop and implement a national membership campaign.</p>
<p>5. To ensure the services and activities of NAPHIT meet the needs of its members</p>	<p>5.1 Establish and maintain procedures for outcome evaluation of all NAPHIT activities.</p> <p>5.2 Convene an annual planning meeting of the Executive Committee and NAPHIT committee chairs to plan and coordinate activities.</p> <p>5.3 Regularly survey NAPHIT membership to identify education and information needs.</p>

Goal	Objectives
6. To ensure operational effectiveness of NAPHIT	<ul style="list-style-type: none"> <li data-bbox="658 155 1224 237">6.1 Provide timely, accurate and useful information required for Executive Committee actions and decisions. <li data-bbox="658 245 1268 328">6.2 Develop a system for tracking all management information to ensure appropriate documentation of NAPHIT activities and outcomes. <li data-bbox="658 336 1287 393">6.3 Establish affiliation with an agency or organization to serve as NAPHIT's fiscal agent.

Appendix 4: PHIN Structure



A single arrow implies an original one-way communication. A double arrow means back and forth communication. In other words, it is an ongoing mutual assistance and constant collaboration between the two entities, most of the time, following the initial one-way communication.

Source: Broome, 2003.

Appendix 5: 2004 Budget for Hospital Preparedness

State/Jurisdiction	Amount in \$U.S.	State/Jurisdiction	Amount in \$U.S.
Alabama	7,762,315	New Mexico	3,770,553
Alaska	1,958,803	New York State	18,019,873
Arizona	9,030,450	New York Metro	12,858,383
Arkansas	5,077,591	North Carolina	13,417,400
California	38,773,727	North Dakota	1,963,221
Los Angeles Metro	15,583,364	Ohio	18,234,914
Colorado	7,704,930	Oklahoma	6,250,131
Connecticut	6,197,207	Oregon	6,255,978
Delaware	2,205,406	Pennsylvania	19,616,940
Dist. of Columbia	2,868,302	Rhode Island	2,603,466
Florida	25,775,967	South Carolina	7,146,769
Georgia	13,719,390	South Dakota	2,147,489
Hawaii	2,856,721	Tennessee	9,699,934
Idaho	2,998,297	Texas	33,338,368
Illinois	15,875,995	Utah	4,448,125
Chicago Metro	5,069,493	Vermont	1,927,552
Indiana	10,270,929	Virginia	11,890,053
Iowa	5,436,624	Washington	10,069,141
Kansas	5,088,830	West Virginia	3,725,218
Kentucky	7,156,894	Wisconsin	9,180,227
Louisiana	7,764,518	Wyoming	1,747,144
Maine	2,943,648	<i>Territories</i>	
Maryland	9,150,163	American Samoa	601,511
Massachusetts	10,686,180	Guam	738,414
Michigan	16,141,386	Puerto Rico	6,808,171
Minnesota	8,542,551	N. Marianas Is.	612,902
Mississippi	5,327,321	Virgin Islands (U.S.)	684,929
Missouri	9,530,322	<i>Freely Associated States</i>	
Montana	2,370,015	F.S. of Micronesia	703,671
Nebraska	3,602,747	Marshall Islands	581,705
Nevada	4,174,253	Palau	528,890
New Hampshire	2,905,650	TOTAL:	\$498,000,000
New Jersey	13,878,940		

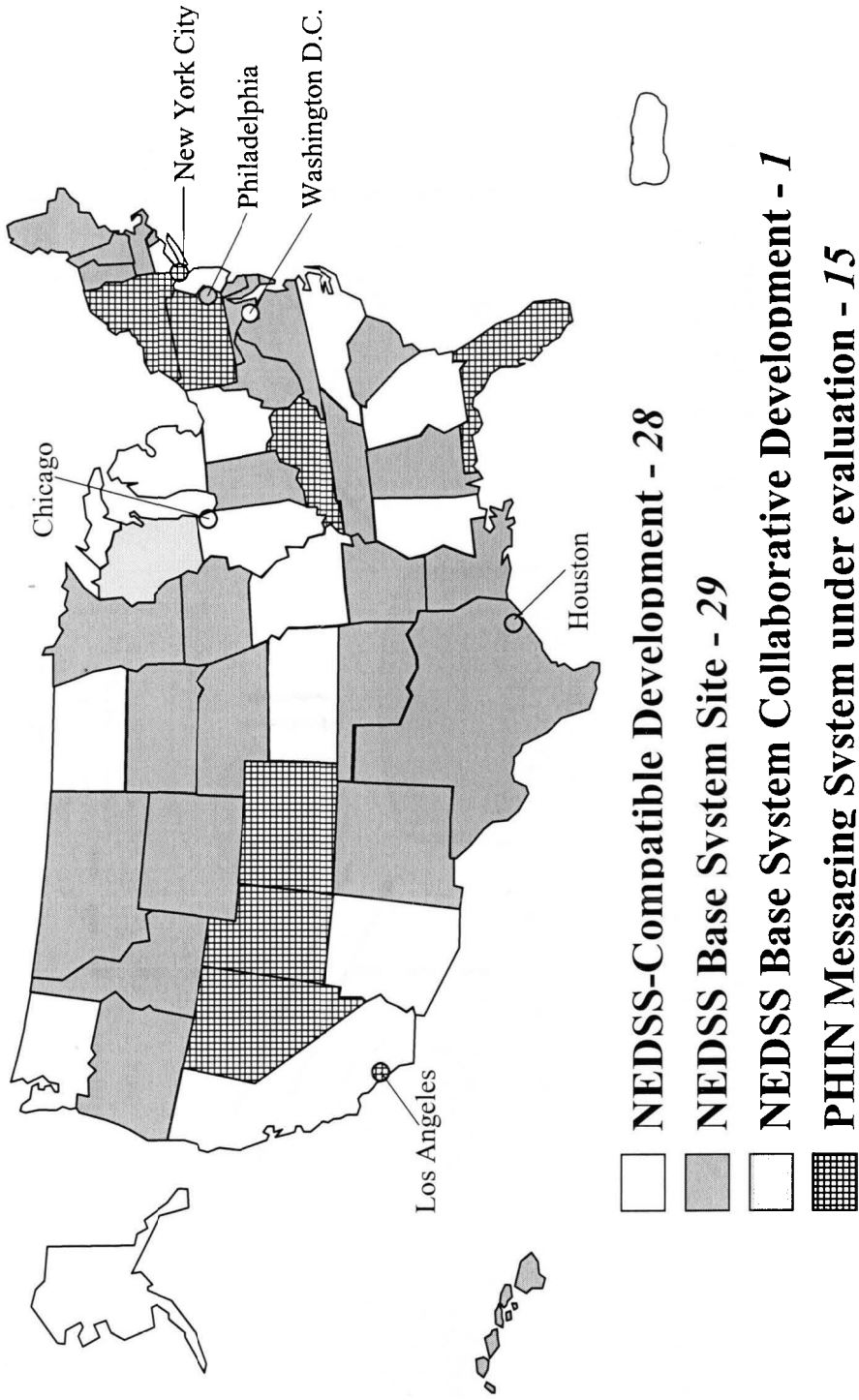
Data Sources: Syndromic.org (NYC workshops, 2003) and www.cdc.gov

Appendix 6: List of activities within public health

Minnesota Intervention Model

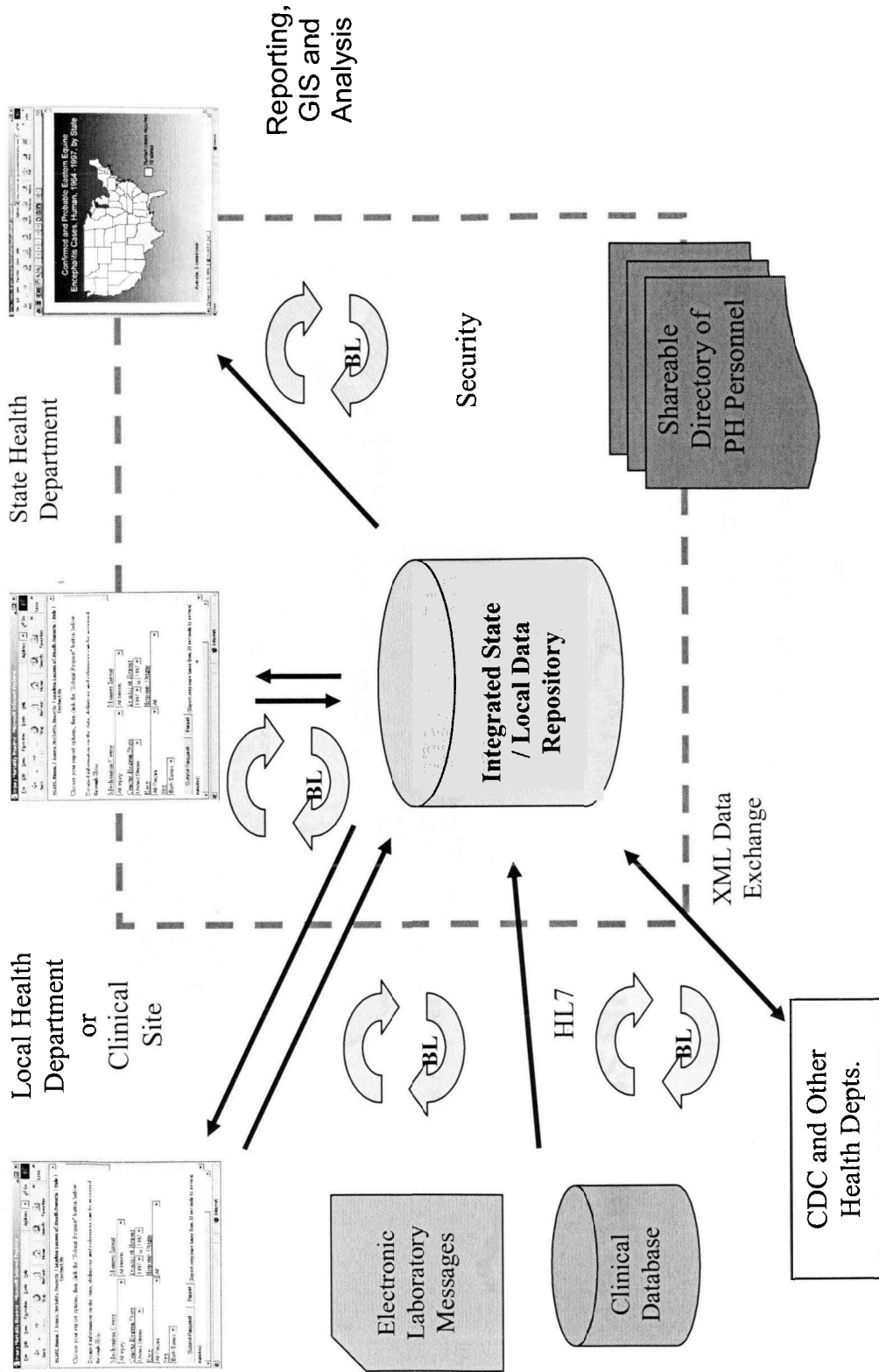
Surveillance	Referral/ Follow- up
Disease Investigation	Case Management
Outreach	Health Teaching
Case Finding	Counselling
Delegated Function	Consultation
Screening	Collaboration
Coalition Building	Social Marketing
Community Organizing	Policy Development
Advocacy	Policy Enforcement

Appendix 7: National PHIN & NEDSS Sites (Original or Compatible)



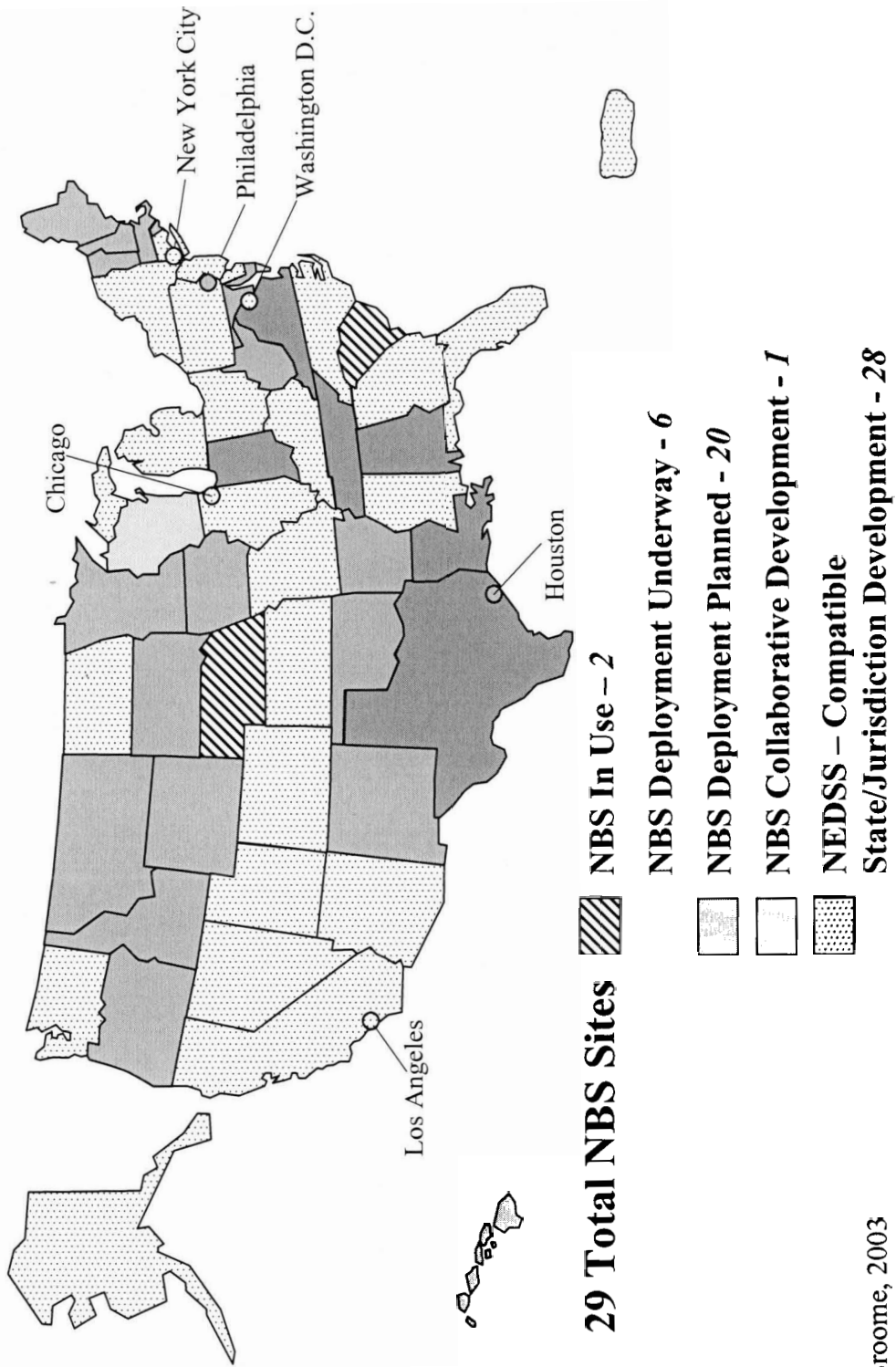
Source: Broome, 2003

Appendix 8: System Architecture for State/Local Health Departments



Source: Broome, 2003

Appendix 9: NEDSS Base System (NBS) Sites Status of 2003



Source: Broome, 2003

Appendix 10: States participating in CDC-funded Public Health Tracking-Monitoring Projects

Last Update: February 2004.

California
Connecticut
Florida
Illinois
Louisiana
Maine
Maryland
Massachusetts
Missouri
Montana
Nevada
New Hampshire
New Jersey
New Mexico
New York
Oklahoma
Oregon
Pennsylvania
Utah
Washington
Wisconsin

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