



Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP)

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T. Finch
R. Naraharisetti
R. Humphrys
R. May-Gentile

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1.0 Program Overview

1.1 National Tracking Network and Program

1.1.1 Background

The Centers for Disease Control and Prevention's (CDC's) Environmental Public Health Tracking (EPHT) Network was established to address the many local and national issues affecting environmental public health. These include:

- Decreased capacity for environmental public health tracking in state and local jurisdictions.
- Lack of common standards in how data are collected, frequency of collection, characteristics collected, and data formats.
- Complexity and time-consuming nature of linking environmental and health systems.

Existing environmental monitoring and health/exposure surveillance systems are generally not compatible. The EPHT Network will make data and tools available to support activities of the EPHT Program and other public health and environmental health programs.

1.1.2 Objectives

The EPHT Program has three main objectives:

- Provide information to initiate public health actions, both immediate and long term, as warranted.
- Conduct planning and evaluation.
- Establish a basis for etiologic studies.

The EPHT Program will facilitate the integration of data on environmental hazards, environmental exposures, and health effects to protect and improve public health. The EPHT Network will support data integration by both owners and users. Integrated data will provide public health agencies with information that can be used to plan, apply, and evaluate actions that prevent and control environmentally related diseases. The Program will provide the flexibility to address national, regional, state, and local environmental public health needs.

1.2 Michigan Tracking Network Project (Phase I)

1.2.1 Background

Michigan joined the CDC EPHT Network in 2014 with the goal of creating an online environmental public health portal. Altarum Institute was tasked with the requirements gathering phase (Phase I) of the project, beginning on November 1, 2014 and concluding on June 30, 2015. Requirements gathered for the portal included (but was not limited to):

- Functional requirements.
- Non-functional requirements.
- Security requirements.

The completion of the requirements gathering phase resulted in this Technical Network Implementation Plan (TNIP) as a roadmap to address how the Michigan Department of Health and Human Services (MDHHS) will meet the following needs:

- Standards
 - Michigan's Enterprise Architecture and EPHT standards (e.g. – data content, secure access, documentation and metadata, and analysis/visualization/reporting).
- System Architecture
 - Selection of the best option based on a make/buy analysis.
- System Components
 - How Nationally Consistent Data and Measures (NCDMs) and Michigan specific measures and indicators will be made available on a public portal, including how/where data should be stored and accessed.
- Program Requirements
 - Staffing, equipment, hardware, software, and other resources, driven by the chosen technical solution for the Michigan Tracking Network.
- IT Policies
 - Michigan Department of Technology Management and Budget's (DTMB) extensive requirements for security, web development, user interface design, and database management systems.
 - Once the portal is deployed, day-to-day maintenance of the system including hardware issues, system big reports and fixes, and any system software updates that are on-going.

1.2.2 Goal and Objectives¹

The Michigan Tracking Network will collect, integrate, analyze, interpret, and disseminate data from environmental hazard monitoring, human exposure, and health effects surveillance. The goal of the Michigan Tracking Network, which will result from increased awareness of the geographic distribution of and links between exposure to environmental hazards and

¹ The MI Tracking Network Goals and Objectives can also be found in Volume 5 (V5).

human health, is improvements in health status and quality of life for Michigan residents.

The objectives used to meet the aforementioned goal are, as stated by the MDHHS, are:

- To provide health, population, and environmental data in one easy-to-find location.
- To inform the public on key environmental health indicators and their geospatial and temporal distribution.
- To improve public health through education about environmental hazards, exposure to those hazards, and health effects potentially related to exposure to environmental hazards.
- To provide policymakers and public health officials information in order to make decisions about where to target environmental public health assistance and interventions.
- To help health practitioners and researchers learn more about health conditions related to the environment.

2.0 System Requirements

2.1 Functional Requirements

This section outlines the functions the Michigan Tracking Network has to perform. The requirements are sorted into core functional areas and the priorities indicated are used to assist with understanding the difference between functional requirements and functional recommendations for the Michigan Tracking Network. Those listed as ‘Required’ must be in place for the first release to the public. Many of the requirements listed below are pulled from the CDC’s document, “Tracking Grantee Portal Requirements and Recommendations (2013)”, and can be found in Volume 4 (V4).

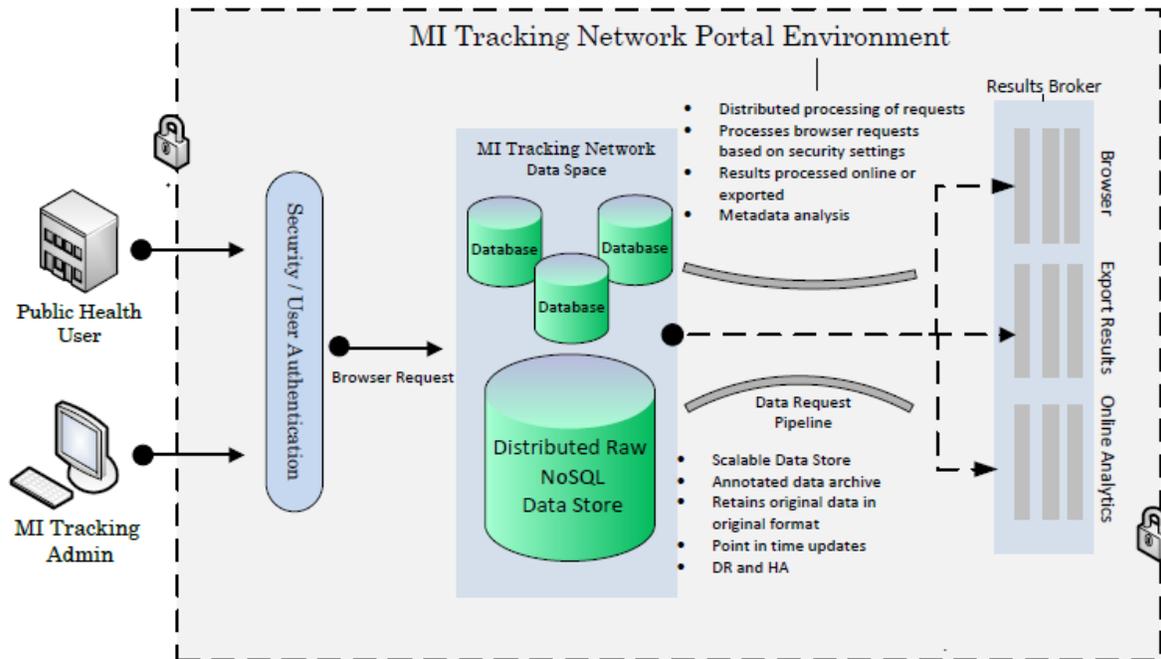
Table 1. Functional Requirements

Ref	Functional Requirements	Priority	Comments
General			
V4	Provide a grantee portal.	Required	
V4	Provide a link to the CDC’s Tracking Network Public Portal from individual grantee public portals.	Required	
V1,V4	Maintain visual consistency among layout and format pages on a grantee’s portal.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
V4	Provide a structured flow that links related information and data sources.	Required	
V4	Comply with Section 508 standards.	Required	
V4	Display the National Tracking Network graphic element.	Required	
V4	Provide access to data query forms, functions, and/or screens within 3 clicks of the portal home page.	Required	
V4	Provide a path to return easily to previous screens.	Recommended	
V1	Provide relevant links to external data and content sites.	Recommended	<ul style="list-style-type: none"> Based on stakeholder analysis.
Analysis, Visualization, & Reporting			

Ref	Functional Requirements	Priority	Comments
V1,V4	Support the means to generate visual displays of data, including maps, charts, and tables.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
V4	Provide the ability to display both counts and rates on a map.	Required	
V1,V4	Use standard color palettes from proven scientific research for color sections charts and maps.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
V4	Provide the capability to combine multiple appropriate data sources in a single results set.	Required	
V1,V4	Ensure that portal provides for the most detailed level of data available and allowed.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
V4	Provide users the ability to see alternate views of the information (i.e. export, quick reports, etc.).	Required	
V1	Users will be able to export data in common formats (e.g. – Excel, .csv) as well as view it in multiple formats including charts, graphs, tables, and maps.	Required	<ul style="list-style-type: none"> Based on stakeholder analysis.
V1,V4	Provide the ability to dynamically generate reports based on user input.	Recommended	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
V4	Provide users the ability to interact with resultant displays (i.e. sorting columns on tables, zoom/pan maps, etc.).	Recommended	
V1	Provide clear and easy-to-understand explanations of resultant data/analyses.	Recommended	<ul style="list-style-type: none"> Based on stakeholder analysis.
Data Content & Discovery			
V1,V4	Provide access to environmental, exposure, and health effect data. At a minimum, includes data/content outlined under the cooperative agreement and CDC Tracking standards for NCDMs.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis (especially health effect data).
V4	Future NCDMs will be added to the submission schedule as they are completed and made available through the portals.	Required	
	Michigan-specific measures and indicators will be added to the portal as the data become available and are prioritized by MDHHS.	Required	
	During development, a process to load the required datasets will be created and along with any	Required	

Ref	Functional Requirements	Priority	Comments
	calculations necessary to create each measure/indicator. These processes will be tested before they are added to the submission schedule.		
V4	Establish clear categories to facilitate data browsing and discovery in order to guide users to data and measures and other information.	Required	
V1	Allow for side-by-side comparison of different resultant data (i.e. side-by-side maps and tables, comparing environmental and health data, etc.).	Recommended	<ul style="list-style-type: none"> Based on stakeholder analysis.
V1	Provide the ability to see data trends in order to do trend analysis (i.e. see trends over time between environmental and health data, etc.).	Recommended	<ul style="list-style-type: none"> Based on stakeholder analysis.
V1	Common queries will be available in various formats for faster access and to relieve the load on the server.	Recommended	<ul style="list-style-type: none"> Based on stakeholder analysis.
V4	Provide access to restricted environmental, exposure, and health effect data.	N/A	<ul style="list-style-type: none"> Required for portals with secure access.
Documentation			
V4	Provide a set of Frequently Asked Questions (FAQ).	Required	
V1,V4	Provide clear definitions of terms.	Required	<ul style="list-style-type: none"> Including consistent use of terminology (based on stakeholder analysis).
V4	Provide on-line documentation.	Required	
V1,V4	Provide a phone number or email address that users may use to get additional information or clarification.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
Metadata			
V4	Allow for the discovery of data by searchable metadata using the Tracking Metadata template for all data available on the grantee's portal.	Required	
V4	Allow access to metadata for available data sets.	Required	
Secure Access			
V1,V4	Provide data security and privacy protection.	Required	<ul style="list-style-type: none"> Also featured in stakeholder analysis.
	Each user's level of access will be controlled by the user's assigned role and whether they are on the public or the secure portal.	Recommended	<ul style="list-style-type: none"> Required for portals with secure access.

Figure 1. MI Tracking Network Environment Diagram



2.1.1 Functional Use Cases

Scenario: Public User Accessing Data via the MI Tracking Portal

- A Michigan resident is interested in asthma information.
- The individual completes an internet search for “Michigan Environmental Tracking Network”, locating the MI Tracking portal.
- The individual selects the hyperlink for MI Tracking and is directed to the homepage.
- The individual selects “Asthma”, from a drop-down list on the homepage.
- The individual accesses informational content about asthma, including dangers, treatment, and prevention from the topic’s main page.
- Upon reading information about asthma, the individual wants to learn more about asthma in their county. From the “Asthma” topic page, the individual selects a “data query” button, which directs to a new page where they can choose the information they wish to search about asthma.
- The content area “Asthma” is selected from the drop-down list in the query.
- The user then selects the desired indicator from a list (e.g. – hospitalizations, ED visits, etc.).
- The query then allows the selection of a measure to explore (e.g. – age adjusted asthma hospitalization rates).
- The individual is prompted to select a year or range of years.

- k. The individual then selects the county, as well as the demographics desired (if any) as part of the search.
- l. Once the search is executed, a new page appears displaying results for county-specific age adjusted asthma hospitalization rates for the years specified in the query.
- m. Results are displayed in a table, a graph, and a map that display the rates and year. The user can access the different displays via tabs in the results window.
- n. The individual selects the “Export to Excel” button and downloads the resultant data for their own personal use.

Scenario: Public User Exploring Data Results

- a. A Michigan college student has queried data for heart attack hospitalizations for all counties in the year 2007.
- b. The resultant display is a map of Michigan by county, displaying a color coded key and hospitalization numbers for each county when you hover over them with the mouse. There is also the ability to alter the query on the results page (i.e. – change the year, the indicator, etc.).
- c. The student wishes to compare how heart attack hospitalizations have changed over time since 2007. They click on a button on the results page labeled “Compare Results”.
- d. The results display splits into two sides – on one side is the previous results from 2007, and on the right is the same exact results display.
- e. The student changes the query on the right side to show heart attack hospitalizations in Michigan by county for 2008.
- f. After submitting the query, the right side of the screen shows the results for 2008, with the left side showing for 2007.
- g. The student is able to switch between each result with the click of a mouse, and is able to hover over counties from both results to see data.
- h. The student clicks on Livingston County in 2007, and the results are displayed on screen to allow for continuous viewing until clicked again. The student clicks on Livingston County in the 2008 results and can now see hospitalization numbers for the same county but in different years, all on the same screen.
- i. The student can also switch displays on each side independently to show charts/graphs, and a table of results by county. This also allows a side-by-side comparison of results displayed differently.

2.1.2 Functional Assumptions/Constraints

The following were considered when developing the functional requirements:

1. Requirements gathering took place from December 9, 2014 through June 15, 2015 (delivery of this document to MDHHS), an approximate period of six months.
2. Prioritization of functional requirements is derived from CDC documentation, and from analysis of stakeholder interviews. Those with a priority of “Required” are called out as such in CDC guidelines. Those with a priority of “Recommended” are based on a combination of CDC guidelines and stakeholder analysis.
3. Categories (Documentation, Metadata, etc.) for functional requirements are derived from CDC guidelines.
4. When selecting and interviewing stakeholders for Phase I, a select sample of environmental and public health professionals were included in the analysis. It is assumed this is a representative sample of public health professionals in Michigan.
 - a. The Stakeholder Analysis Matrix can be found in Volume 1 (V1)
5. Due to time constraints, unknown answers, and other matters, not every question was answered by stakeholders during interviews. Therefore, the stakeholder analysis contains [Blank] items where information was unavailable or not obtained.
6. Use cases are examples of functional requirements in action on a hypothetical online environmental public health portal. They reflect knowledge derived from CDC documentation, stakeholder interviews, and further information gathering.
7. There will be public access to the MI Tracking Network. The public portal will be deployed by the second quarter of the third year.

2.2 Non-Functional Requirements

The non-functional requirements describe the quality of the network and the overall properties of the system as a whole or of a particular aspect, and not a specific function. The table below is separated into categories, each of which is listed and explained below:

- Usability: Addresses ease-of-use, including the factors that constitute the capacity of the MI Tracking Network to be understood, learned, and used by its intended users.
- Reliability and Performance: Describes the degree to which the network must work for users, as well as response time, transaction throughput, and capacity.
- Supportability: Describes the network’s ability to be easily modified or maintained to accommodate typical usage.
- Operating Environment Requirements: This section identifies requirements that relate to the architecture of the MI Tracking Network. The MI Tracking Network shall be a Web-based application represented by a three-tiered architecture system, as depicted in *Figure 2*, which will include a Web client,

a network/application server, and a back-end information system supported by databases.

- **Interface Requirements:** Identifies the requirements with respect to the interfaces of the MI Tracking Network. These interfaces include hardware, software, and database interfaces.
- **Maintenance:** Provides system requirements and procedures which ensure periodic updates, backups, and general upkeep of the portal.

The first step of development is the design of the architecture of the MI Tracking Network system as a whole. This step takes a systemic look at all the components of the system and insures a consistent look-and-feel and, most importantly, that all the system components, the public portal, and the data and measures themselves, all function seamlessly together. Also, interfaces to other systems are designed in a way that includes the preliminary design of the routes in the interface engine to support data being pulled from other sources.

Table 2. Non-Functional Requirements

Ref	Requirement	Priority	Comments
Usability			
V2	The user interface actions and elements should be consistent.	Required	<ul style="list-style-type: none"> • Also featured in grantee analysis.
	The network shall comply with the Americans With Disabilities Act and Priority 1 Level Checkpoints of the World Wide Web Consortium (W3C) Web Content Accessibility Guidelines 1.0. located at: http://www.w3.org/TR/WAI-WEBCONTENT/	Required	
V2	The network should allow public users to utilize the data and information with no training.	Required	<ul style="list-style-type: none"> • Also featured in grantee analysis.
	The network shall comply with the State of Michigan <i>Look and Feel Standards</i> located at: www.michigan.gov/somlookandfeelstandards .	Required	
V2	User interface elements/menus should be easy to understand.	Recommended	<ul style="list-style-type: none"> • Also featured in grantee analysis.
	The user documentation and help should be complete, and able to be located by both an icon and hyperlink.	Recommended	

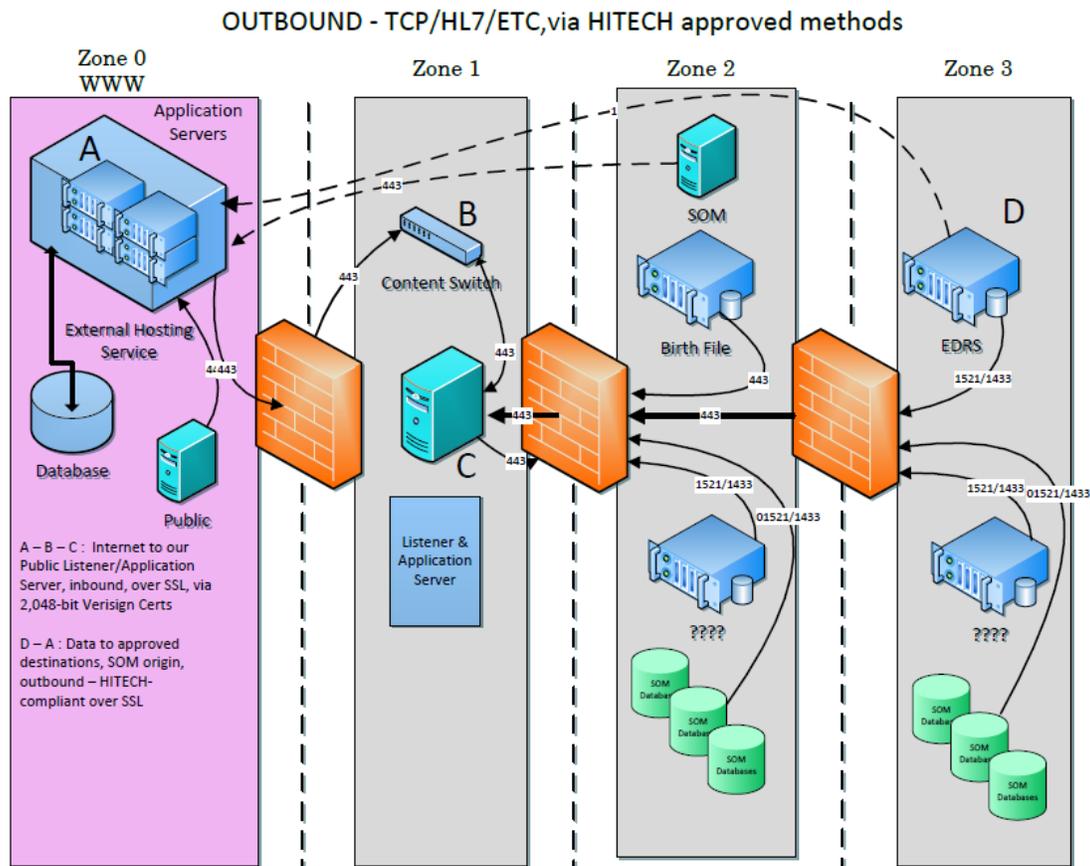
Ref	Requirement	Priority	Comments
	The <i>Help</i> section should explain how to achieve common tasks, such as obtaining data in a spreadsheet format and viewing data for a specific indicator.	Recommended	
	Error messages should explain how to recover from the error.	Recommended	
	Undo should be available for most actions.	Recommended	
	Actions which cannot be undone should ask for confirmation.	Recommended	
	The network should be customizable and scalable to meet specific user needs.	Recommended	
	The network should be easy to locate via an Internet search.	Recommended	
Reliability and Performance			
	The network shall be accessed via a secure Uniform Resource Locator (URL).	Required	
	The network shall support an unlimited amount of concurrent public users.	Required	
	The network shall support an unlimited number of concurrent users via the Michigan SSO.	Required	
	The network shall provide better than 99% “Up Time” cumulatively across a service year.	Recommended	
	The network shall provide explanation to the user during “Down Time”, including the reason for the disruption along with the expected “Up Time.”	Recommended	
	Users will be notified 2 weeks prior to a scheduled “Down Time”.	Recommended	
	All web pages shall download within three seconds during an average load, and five seconds during a peak load.	Recommended	
V1	The network shall be supported 24x7x365 via ticket, phone, email, and/or chat.	Recommended	<ul style="list-style-type: none"> • Also featured in stakeholder analysis. • Phone/Email support is required by the CDC; availability is ambiguous.

Ref	Requirement	Priority	Comments
	<p>Testing of the system should occur in a test server before moving information to a production server. Testing includes:</p> <ul style="list-style-type: none"> • <u>Load testing</u>: this tests the ability of the system can handle the expected data and user loads. • <u>Functionality testing</u>: this ensures that each requirement is met and is operating properly. • <u>UI testing</u>: this tests the system under each of the supported browsers. • <u>Security testing</u>: to ensure that each user type can access only the data allowed by that role. • <u>Usage tracking</u>: this will test our ability to track usage of both portals and create reports based on that usage (that show trends in usage to help increase traffic to site). 	Recommended	
Supportability			
	The network shall be supported by Internet browsers supported by DTMB, currently Internet Explorer 8, as well as previous and subsequent releases of Internet Explorer. Additional Internet browsers, such as Mozilla Firefox, Chrome and Safari, may also be supported.	Required	
V2	The network shall support role-based administration to allow for various levels of access, including at least view-only access and administrator access. Roles could include limitations by NCDM, county/jurisdiction, and administrative role in the organization.	Required	<ul style="list-style-type: none"> • Also featured in grantee analysis.
	The network shall support auditing capabilities (such as the ability to check data for accuracy, etc.).	Required	
V2	The network shall support generation of reports and make available for download in CSV, XML, HTML, Microsoft Excel, and Adobe PDF formats.	Recommended	<ul style="list-style-type: none"> • Also featured in grantee analysis. • Also called out in “Functional Requirement” table above.

Ref	Requirement	Priority	Comments
	The reports shall use current DTMB Client and Office Suite Technology Standards, which can be located at: http://www.michigan.gov/documents/dit/Client_Office_385779_7.pdf	Recommended	<ul style="list-style-type: none"> Becomes “Required” if portal is able to generate reports (of the resultant indicator data) based on user input.
V2	The network shall be server-based with web-based front-end interface.	Recommended	<ul style="list-style-type: none"> Also featured in grantee analysis.
Operating Environment Requirements			
	The Michigan Tracking Network will be supported by both production and test environments.	Required	
	The production system shall back-up information every 24 hours.	Recommended	<ul style="list-style-type: none"> Production servers should back up on a regular schedule.
Interface Requirements			
	User interface requirements shall adhere to DTMB standards. http://www.michigan.gov/documents/som/Look_and_Feel_Standards_302051_7.pdf	Required	<ul style="list-style-type: none"> Only required if hosted through DTMB.
	The network shall communicate directly with data stored in DTMB Zone 2 (<i>Figure 2</i>). This data shall be able to be queried by both public and secure users.	Required	<ul style="list-style-type: none"> Only required if hosted through DTMB.
	The network shall display de-identified, suppressed, and aggregate data to the user.	Required	
	The system shall send de-identified, suppressed, and aggregate NCDM data to the CDC via XML format.	Required	
	Source data shall be refreshed monthly at a minimum.	Recommended	
Maintenance			
	System maintenance and administration requires the periodic review of: <ul style="list-style-type: none"> Registered users and user access permissions. Valid selections in drop down or standardized lists. NCDMs Checking of broken links 	Required	

Ref	Requirement	Priority	Comments
V2	An administrator must provide updated source data on a regular basis (i.e. daily, weekly, monthly, annually).	Required	<ul style="list-style-type: none"> Also featured in grantee analysis.
	The system must be part of the cyclic backup procedures.	Recommended	

Figure 2. MI Tracking Network Architecture and Zoning



2.2.1 Non-Functional Assumptions/Constraints

The following were considered when developing the non-functional requirements:

1. Requirements gathering took place from December 9, 2014 through June 15, 2015 (delivery of this document to MDHHS), an approximate period of six months.
2. Data Use Agreements have been signed (if applicable) by all owners of the data sources providing NCDMs, including:
 - a. Division of Vital Records & Health Statistics (DVRHS) of Michigan

- i. Michigan Inpatient Database (MIDB), which contains hospitalization data for
 - 1. Acute myocardial infarction (heart attack)
 - 2. Asthma
 - 3. Carbon monoxide
 - 4. Heat stress
 - ii. Michigan Birth Registry, which contains data for
 - 1. Reproductive health prematurity
 - 2. Reproductive health low birth weight
 - 3. Reproductive health sex ratio
 - 4. Reproductive health fertility rate
 - iii. Michigan Birth Defects Registry (MBDR), which contains birth defect data
 - iv. Michigan Infant Death File, which contains infant mortality data
 - v. Michigan Cancer Registry, which contains cancer data
 - vi. Michigan Death Registry, which contains carbon monoxide mortality data
 - b. U.S. Census
 - i. Childhood lead poisoning by Age of Housing
 - c. Childhood Lead Poisoning Prevention Program (CLPPP) of Michigan
 - i. Childhood lead poisoning data in the Michigan Statewide database
 - d. Department of Environmental Quality (DEQ) of Michigan
 - i. Air quality annual and PM 2.5 days above regulatory standard in the Air quality monitoring data of the Air Quality Division
 - ii. Air quality ozone days above regulatory standard in the air monitoring data of the Air Quality Division
 - iii. Community drinking water contaminant concentrations in the Safe Drinking Water Information System (SDWIS) of the Office of Drinking Water and Municipal Assistance
 - iv. Community drinking water public water use in the SDWIS of the Office of Drinking Water and Municipal Assistance
- 3. Data utilized by the MI Tracking Network will be located in DTMB Zone 2.
- 4. When interviewing grantees for Phase I, a select sample of grantees were included in the analysis. It is assumed that those selected by MDHHS provide valuable insight into the future design and implementation of MI Tracking.
 - a. The Grantee Analysis Matrix can be found in Volume 2 (V2).
 - b. The Scoring of Grantee Portals can be found in Volume 3 (V3).
- 5. Due to time constraints, unknown answers, and other matters, not every question was answered by stakeholders and grantees during interviews. Therefore, the stakeholder and grantee analyses contain [Blank] items where information was unavailable or not obtained.
- 6. There will be public access to the MI Tracking Network. The public portal will be deployed by the second quarter of the third year.

2.3 Security Requirements

The primary goals of security are confidentiality, integrity, availability, accountability, and assurance. The network should ensure:

- Secure information is not accessed by unauthorized users.
- Protection of information from unauthorized modification.
- Information is available when needed and is not made inaccessible by malicious data-denial activities.
- Every action can be uniquely traced.
- Confidence in the security of the system with respect to predefined security goals.

To meet the above goals, the MI Tracking Network shall establish appropriate web, application, and data safeguards to protect any and all State of Michigan data, the individuals in these datasets, and the MI Tracking Network users. The network shall comply with all IT Policies, Standards, and Procedures located at:

http://michigan.gov/dtmb/0,4568,7-150-56355_56579_56755---,00.html.

Policies 1335, 1340.00, and 1340.00.01 are specifically called out below in the Security Requirements table; however, all IT policies, standards, and procedures should be followed according to the language available in the policies themselves.

Table 3. Security Requirements

Ref	Requirement	Priority	Comments
Web/Application			
V2	The network shall restrict access to secure data by utilizing the role-based access control (RBAC) model, which allows access to data and/or functionality based on organizational role of the user. Roles may include limitations by NCDM, county/jurisdiction, and administrative role in the organization.	Required	<ul style="list-style-type: none"> • Also featured in grantee analysis
	The network must utilize a secure, encrypted HTTPS:\\ connection for accessing all web pages, site functions and for all data exchanges between the server and browser. HTTPS:\\ certificates to be provided by a trusted source recognizable to the user's browsers without the need to install a third-party trusted server.	Required	
	Only authorized users shall administer, alter, or destroy web content.	Required	
	All users of the network shall comply with the following Michigan.gov policies at http://michigan.gov/dtmb/0,5552,7-150-9141_58786_58800-281460--,00.html , including, but not limited to: <ul style="list-style-type: none"> • Terms of Use 	Required	

Ref	Requirement	Priority	Comments
	<ul style="list-style-type: none"> • Accessibility Policy • Privacy Policy • Security Policy • Link Policy 		
V2	Prior to implementation, the website, web services, and web application shall undergo thorough testing using security or vulnerability scanners, penetration testing software, and source code analyzers. In addition, load and input testing are recommended.	Required	<ul style="list-style-type: none"> • Also featured in grantee analysis
	The network shall utilize malware protection.	Required	
Data			
	<p>Per <i>Policy 1340.00 Information Technology Information Security</i> (http://michigan.gov/documents/dmb/1340_193162_7.pdf?20150528110955), the MI Tracking Network shall ensure:</p> <ul style="list-style-type: none"> • Confidentiality by limiting information access and disclosure to authorized users (“the right people”) and preventing access by or disclosure to unauthorized users (“the wrong people”). Confidentiality is defined as protecting information from unauthorized disclosure or interception and assuring that information is shared only among authorized persons and organizations. • Integrity by the trustworthiness of information resources. It includes the concept of “data integrity”, namely, that data have not been changed inappropriately, whether by accident or deliberate activity. It also includes the need to verify that the person or entity has entered the right information that is, that the information reflects the actual circumstances and that under the same circumstances would generate identical data. Integrity is defined as guarding against improper information modification and/or destruction, ensuring information has not been altered by unauthorized people and the assurance that the information can be relied upon to be sufficiently accurate for its purpose. • The availability of information resources. An information system that is not available when you need it is at least as bad as none at all. It may be much worse, depending on how reliant the organization has become on a functioning computer and communications 	Required	

Ref	Requirement	Priority	Comments
	<p>infrastructure. Availability is defined as ensuring timely and reliable access to and use of information and assuring that the systems responsible for delivering, storing and processing information are accessible when needed, by those who need them.</p>		
	<p>Per <i>Policy 1340.00 Information Technology Information Security</i> (http://michigan.gov/documents/dmb/1340_1931627.pdf?20150528110955), the Michigan Tracking Network shall ensure:</p> <ul style="list-style-type: none"> • Due diligence of confidentiality, integrity and availability of data • Data management in compliance with Federal and state laws and regulations, and SOM policies • Information security controls are implemented to protect the SOM information and that these controls are sufficient to ensure the confidentiality, integrity, availability of SOM information • Information security controls are applied in a manner consistent with the value of the information • Data business owner identification. Although it is not recommended to have multiple owners for the same data, this sometimes occurs. Where there is more than one owner, data owners must designate a business owner who will have authority to make decisions on behalf of all the owners of this data • SOM agency information is identified and classified based on sensitivity, criticality and risk in compliance to federal and state laws and regulations, includes a review at least once a year of the ongoing need to continue protection, updates when the environment changes. • A system is established to identify baseline security controls to protect SOM information. Once it is identified and classified, ensure it is exposed only to those who have a need to know the information and a duty to protect it. • SOM agency information is safeguarded with the proper controls in accordance with its classification label. • Data, which is shared or transferred between agencies, is protected by the receiving 	Required	

Ref	Requirement	Priority	Comments
	<p>agency with at least the same level of security used by the sending agency. The receiving agency assumes the responsibility of data owner for such data when it is transferred.</p> <ul style="list-style-type: none"> • Anyone requiring access to confidential or restricted information that is owned by another agency must obtain permission from the Business Owner.² • Controls are established to provide SOM oversight of trusted partners who handle SOM information on behalf of the SOM. • SOM agency information is disposed of and sanitized in compliance with SOM policies. • A formal internal process is established for reporting and responding to security breaches/incidents where there is reasonable belief that an unauthorized person may have acquired personal identifying information. • A system is established to review technical controls and recommendations identified by the SOM data custodians. • Internal agency security policies and procedures are implemented, maintained, and enforced that compliment and comply with this policy. • All SOM employees and trusted partners handle information for which they are responsible in compliance with this policy and all SOM IT policies. • SOM employees and trusted partners are trained to ensure they are aware of their role in protecting SOM information and data as set forth in this policy • Employees are advised of the necessity of complying with DTMB policies and laws pertaining to the protection of SOM information, because noncompliance may leave the state liable and employees vulnerable to prosecution and civil suite, as well as disciplinary action. 		
	<p>Based on information included in <i>Policy 1335 Information Technology Access Control</i> (http://michigan.gov/documents/dmb/1335_1931617.pdf?20150528110955), the Michigan Tracking</p>	Required	

² Where there is more than one owner for the same data, Data Owners must designate a Business Owner who will have authority to make decisions on behalf of all owner of this data.

Ref	Requirement	Priority	Comments
	<p>Network shall ensure Access Control by:</p> <ul style="list-style-type: none"> • Access to the SOM network and IT resources and other technology resources shall be strictly controlled such that only SOM authorized users have access to the available information based on three basic components of access control and they are defined as: <ul style="list-style-type: none"> ○ Authentication - the process of determining whether someone or something (system) is, in fact, who or what it is declared to be. Example: use of a password to confirm correct association with a user name or account name. ○ Authorization - the process of giving the authenticated person or system access to the SOM network and IT resources and determining what type of access is allowed, (e.g., read only, create, delete, and/or modify). ○ Accountability - the process of determining the identity, activity and usage of a system by a user or system • A formalized process is developed to manage user access to the SOM Network and IT resources in compliance with this (Policy 1335) and all SOM policies that: <ul style="list-style-type: none"> ○ Limits access to authorized users whose job responsibilities require it as determined by the agency internal approval process. ○ Allows access to be managed, controlled and periodically reviewed and audited to ensure user access is based on specific privilege granted. ○ Provides a mechanism for controlling and documenting the allocation of user access rights from initial access rights, as a new user, through to de-registration, when the user changes jobs or leaves the agency. ○ Utilizes methods that provide user authentication, authorization and accountability. ○ Promotes separation of duties, least privilege, and a need to know. 		

Ref	Requirement	Priority	Comments
	<ul style="list-style-type: none"> ○ Ensures users approved to access established services on the SOM network and IT resources are approved in compliance with this and all SOM policies. • State departments desiring to implement more stringent policies than those developed by DTMB, may do so in conjunction with DTMB. 		
	<p>Acceptable Use of Information Technology, Standard Number 1340.00.01 www.michigan.gov/pcpolicy</p> <ul style="list-style-type: none"> • Users must maintain the security of State data. Providing unauthorized persons any information that is sensitive or protected by law; unauthorized posting of State information to external newsgroups, bulletin boards, or other public forums; sharing personal information about another person unless part of legitimate job duties; and the storing State information in public storage services without DTMB approval are prohibited. • Users must follow all applicable security policies and standards and are responsible for the reasonable (1) physical security and protection of their IT Resources and devices and (2) protection and use of granted access. Users shall not reveal to or allow use of their accounts or passwords by others, including family members. Users shall not leave workstations, devices, or IT Resources unattended without engaging password protections. • Data is a valuable state asset that must be protected. Any data Users create, store, process, or send using State IT Resources remains the property of the State. • DTMB shall communicate this standard to all Users, ensure that Users read and understand this standard, and develop processes to certify and document User acceptance. • SSO Users shall read this standard, understand its expectations, and follow its provisions. Each user shall acknowledge receipt of this standard and any agency-specific addenda. Each User shall report all 	Required	

Ref	Requirement	Priority	Comments
	<p>violations to their manager or Agency contact, who must report all violations to Michigan Cyber Security (MCS).</p> <ul style="list-style-type: none"> Agents, contract staff, vendors, and volunteers who use IT Resources shall follow and acknowledge awareness of this standard 		
	<p>The network shall include auditing capability. The database operation shall produce an audit trail of information including information such as:</p> <ul style="list-style-type: none"> The database objects that were impacted Person that performed the operation and when The old content prior to the change or modification Data retrieved <p>Audit trails help promote data integrity by enabling the detection of security breaches, also referred to as intrusion detection.</p> <p>The database access auditing solution should provide an independent mechanism for the long-term storage and access of audit details. The solution should offer the canned queries for the most common types of queries, but the audit information should be accessible using industry standard query tools to make it easier for auditors to customize queries as necessary.</p>	Required	

2.3.1 Security Assumptions/Constraints

The following were considered when developing the non-functional requirements:

1. Requirements gathering took place from December 9, 2014 through June 15, 2015 (delivery of this document to MDHHS), an approximate period of six months.
2. Data utilized by the MI Tracking Network will be located in DTMB Zone 2.
3. When interviewing grantees for Phase I, a select sample of grantees were included in the analysis. It is assumed that those selected by MDHHS provide valuable insight into the future design and implementation of MI Tracking.
 - a. The Grantee Analysis Matrix can be found in Volume 2 (V2)
 - b. The Scoring of Grantee Portals can be found in Volume 3 (V3).

4. Due to time constraints, unknown answers, and other matters, not every question was answered by stakeholders and grantees during interviews. Therefore, the stakeholder and grantee analyses contain [Blank] items where information was unavailable or not obtained.
5. There will be public access to the MI Tracking Network. The public portal will be deployed by the second quarter of the third year.

List of Acronyms

<u>Acronym</u>	<u>Acronym Definition</u>
CDC	Centers for Disease Control and Prevention
CLPPP	Childhood Lead Poisoning Prevention Program
DEQ	Department of Environmental Quality
DTMB	Department of Technology, Management, and Budget
DVRHS	Division of Vital Records & Health Statistics
EPHT	Environmental Public Health Tracking
MBDR	Michigan Birth Defects Registry
MCS	Michigan Cyber Security
MDHHS	Michigan Department of Health and Human Services
MIDB	Michigan Inpatient Database
NCDM	Nationally Consistent Data and Measures
RAD	Restricted Access Database
RBAC	Role-Based Access Control
SDWIS	Safe Drinking Water Information System
SOM	State of Michigan
SSO	Single Sign-On
TNIP	Technical Network Implementation Plan
UI	User interface
V1	Volume 1: Stakeholder Interview Analysis Matrix
V2	Volume 2: Grantee Interview Analysis Matrix
V3	Volume 3: Michigan Tracking Network Grantee Scorecard
V4	Volume 4: Tracking Grantee Portal Requirements (CDC, 2013)
V5	Volume 5: Michigan Tracking Network Objectives

**Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) -
Volume 1: Stakeholder Interview Analysis Matrix – Part 1**

Organization	Factors Effecting Decision Making (BF)	Wish List for Public Portal (USEFUL)	Information Content (INFO)	Experience with Online Portals (EXP)
A Michigan local health department	Funding; Availability of Data	Data From Other States; New Data Content	Connecting Data; Contact Info	Real Time Data
An Environmental organization	Funding; Political	Maps, New Data Content	Purpose of Portal	Easy to Navigate; Simple User Interface; Alerts to User
State health department	Member base/ Community; Availability of Data	Socio-demographic Data	Disease Specific Information; Contact Info for Help; Explain Analysis	Consistent Terminology
State health department	Organizational goals	Cleaned and Formatted; Maps	Links to Other Websites About Data; Explain Analysis	Easy to Navigate; Simple User Interface; Consistent Terminology
State health department	Funding; Political; Superiors in Organization; Availability of Data	New Data Content-Health	[Blank]	[Blank]
A Michigan local health department	Funding; Member base/Community; Availability of Data; Organizational Goals	New Data Content-Health	Disease Specific Information; Links to Other Websites About Data; Connecting Data; Explain Analysis	Easy to Navigate; Simple User Interface; Consistent Terminology

Organization	Factors Effecting Decision Making (BF)	Wish List for Public Portal (USEFUL)	Information Content (INFO)	Experience with Online Portals (EXP)
State health department	[Blank]	New Data Content-Health	Links to Other Websites About Data; Contact Info for Help	[Blank]
State health department	Funding; Political; Member base/Community; Regulatory	New Data Content-Health	Disease Specific Information; Explain Analysis	Easy to Navigate; Simpler User Interface; Consistent Terminology
Occupational & Environmental Association	Funding; Organizational Goals	New Data Content-Health	Explain Analysis	Consistent Terminology
A Michigan local health department	Funding; Political; Member base/Community; Regulatory	New Data Content-Environmental	Disease Specific Information; Connecting Data; Explain Analysis	[Blank]
A Michigan local health department	Funding; Superiors in Organization; Member base/Community	Data from other States/Districts; New Data Content-Health	Disease Specific Information	Maps Are Displayed Well

**Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) -
Volume 1: Stakeholder Interview Analysis Matrix – Part 2- Accessing, Utilizing, Sharing**

Organization	Accessing- How (AH)	Accessing- Challenges (AC)	Utilizing- How (UH)	Utilizing- Challenges (UC)	Sharing- How (SH)	Sharing- Challenges (SC)
Part 2- Accessing- Utilizing- Sharing						
A Michigan local health department	Collected Data; MI Data; Local Sources	Unavailable Data; Multiple Sources; Old Data; Formatting	Geomapping; Trend Analysis; Program Evaluation; Future Planning/Budgeting; Surveillance of Jurisdiction; Identify Populations	Missing or Inaccurate Data; Difference in Formats	Media shared with jurisdiction; Reports	Accessible to Public; Misinterpretation
An Environmental organization	MI Data	Multiple Sources; Inaccurate	Education/Outreach	Gap between Health and EH Data;	Media Shared with Jurisdiction; Online; Brochures; Reports	Accessible to Public; Defining Importance and Impact
State health department	Hospital Databases/ Registries	Inaccurate; Cost and Funding; Collection	Trend Analysis; Program Evaluation; Future Planning/Budgeting; Surveillance of Jurisdiction	[Blank]	Data to Other Organizations; Timeliness	[Blank]

Organization	Accessing- How (AH)	Accessing- Challenges (AC)	Utilizing- How (UH)	Utilizing- Challenges (UC)	Sharing- How (SH)	Sharing- Challenges (SC)
Part 2- Accessing- Utilizing- Sharing						
State health department	Collected Data; National Health Data; Local Sources; Claims	Collection	Program Evaluation; Future Planning/Budgeting; Identify Populations	[Blank]	Media Shared with Jurisdiction; Data to Other Organizations	Defining Importance and Impact; Sharing Data Easily with Stakeholders- Security Issue
State health department	National Health Data-Vital Records; National Health Data-BHFSS; MI data; Hospital Database/ Registries	Multiple Sources; Formatting	[Blank]	Analysis Resources	Media Shared with Jurisdiction- Reports	Sharing Data Easily with Stakeholders- Security Issue; Funding
A Michigan local health department	National Health Data-CDC; National Health Data- BHFSS; MI Data; Local Sources; Hospital Databases/ Registries	Multiple Sources	Compliance	Analysis Resources	Media Shared with Jurisdiction	Accessible to Public

Organization	Accessing- How (AH)	Accessing- Challenges (AC)	Utilizing- How (UH)	Utilizing- Challenges (UC)	Sharing- How (SH)	Sharing- Challenges (SC)
Part 2- Accessing- Utilizing- Sharing						
State health department	Collected Data; National Environmental Data; National Health Data-CDC; MI Data; Hospital Databases/ Registries; Claims	Unavailable Data; Multiple Sources; Old Data; Incomplete	[Blank]	[Blank]	Reports for Funding; Media Shared with Jurisdiction; Data to Other Organizations	[Blank]
State health department	Collected Data	Incomplete; Inaccurate; Collection	Compliance	Inconsistent Data Items and Specifications	Reports for Funding; Media Shared with Jurisdiction; Data to Other Organizations	Misinterpretation; Funding
Medical Association	[Blank]	[Blank]	[Blank]	[Blank]	Reports for Funding; Media Shared with Jurisdiction; Data to Other Organizations	Misinterpretation
A Michigan local health department	Collected Data; MI Data; Local Sources	Multiple Sources; Old Data; Incomplete; Inaccurate	Trend Analysis; Program Evaluation; Surveillance of Jurisdiction; Compliance	Missing and Inaccurate Data; Inconsistent Data Items and Specifications; Analysis Resources; Hard to Interpret	[Blank]	[Blank]
A Michigan local health department	Collected Data; National Environmental Data; MI Data; Local Sources	Unavailable Data; Old Data	Trend Analysis; Program Evaluation; Future Planning/Budgeting; Surveillance of Jurisdiction	Missing and Inaccurate Data ; Gap Between Health Data and Environmental Data; Privacy Concerns	Reports for Funding; Media Shared with Jurisdiction; Data to Other Organizations	Sharing Data Easily with Stakeholders- Security Issue; Funding

**Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) -
Volume 2: Grantee Interview Analysis Matrix – Technical Elements & Management Elements**

Grantee State	Grantee #1	Grantee #2	Grantee #3	Grantee #4	Grantee #5	Grantee #6	Grantee #7
Technical Elements							
Homegrown or Commercial System	Homegrown	Homegrown	Commercial	Homegrown	Homegrown Commercial	Homegrown Commercial	Homegrown
Database Type	N/A ¹	N/A	SQL Servers	N/A	N/A Oracle (Also work with COGNOS, ArcGIS, VMware)		N/A
Physical or Virtual Server	Virtual	Physical (now virtualizing)	Virtual	Virtual	Physical	Physical	Virtual
Reasons to Create or Buy	[Blank] ²	Multiple	Multiple	Multiple	[Blank]	Multiple	Convenience
Type of Web Server	Apache Tomcat 6	IIS	Instant Atlas Server	Apache	Windows Server 2003	Apache (with COGNOS)	Microsoft Windows Server
Virtual or Physical Web Server	Virtual	N/A	Virtual	Virtual	Physical	Virtual	Virtual
External Services Used	ArcGIS	Geosupport, ArcGIS, D3.JS, JQueryes	Instant Atlas Desktop and ArcGIS	ESRI, Google Analytics, Chart Director, IBIS	ESRI	COGNOS, ArcGIS, VMware	High Chart JS, ESRI, SAS
External Services Behind Firewall	Yes	[Blank]	Yes	Yes	[Blank]	No	Partial

¹ N/A items indicate that a previous answer or other circumstance makes this question incapable of having an answer for that grantee.

² Blank items indicate an item that may or may not have an answer, but due to time constraints, interviewee knowledge, or other factors, no answer could be provided.

Grantee State	Grantee #1	Grantee #2	Grantee #3	Grantee #4	Grantee #5	Grantee #6	Grantee #7
	Technical Elements						
Maintenance Costs	\$17,000/YR	Unknown	~\$8,000/YR (ArcGIS)	~\$30,000/YR	Unknown	\$30,000-\$50,000/YR	Unknown
Host Site Location: On-Site or Off-Site	Off-site	On-site	On-site	On-site	On-site	On-site	On-site
Host Cost	[Blank]	\$0.00	Unknown	~\$30,000/year	Unknown	\$50,000 - \$60,000/YR	\$0.00
Calculations Generation Technique	At time of request	Both pre-calculated and at-time of request	Pre-calculated	[Blank]	[Blank]	[Blank]	At time of request
Method Used to Ensure Incoming Data Integrity	[Blank]	Human	Mix	Mix	Human	[Blank]	Mix
Any Major Updates to the Interface or Content of the Website	No, but in process of full update	Yes, summer 2015	Yes, twice since launch in 2012	Yes	Yes, summer 2014	Yes	Yes
Timeline Between Launch and Updates in Years	N/A	~5 years	Unknown	2 Years	~3 Years	~ 5 Years	~2 years

Grantee State	Grantee #1	Grantee #2	Grantee #3	Grantee #4	Grantee #5	Grantee #6	Grantee #7	
	Management Elements							
IT FTEs Involved With Development	3	Unknown	1	Unknown	Unknown (developed by contractors)	Unknown	2	
Non-IT FTEs Involved With Development	5	2	4	Unknown	Unknown (developed by contractors)	Unknown	1	
IT FTEs Involved in Maintenance	3	Unknown	1	Unknown	[Blank]	Unknown	2	
Non-IT FTEs Involved in Maintenance	6	Unknown	4	Unknown	1 (Assumed by Interviewed Staff)	Unknown	1	
Total Time for Development from Launch to Live	5-6 years	2 years	3 years	~ 3 years	Unknown	~ 7 Years	~5 years	
Pilot Phase Before Going-Live	Yes	[Blank]	Somewhat	Somewhat	[Blank]	No	Yes	
Who Pilot Tested	Others	[Blank]	Others	Data Stewards	[Blank]	[Blank]	Internal	

M. Stanbury
J. Roos
T. Finch

***Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) - Volume 3: Grantee Site Score Card**

*Available upon request

Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) - Volume 4: Tracking Grantee Portal Requirements (CDC, 2013)

Tracking Network Portal Requirements and Recommendations

Element	Public Portal	Secure Portal
General		
Provide a grantee portal.	Required	Highly Recommended
Provide a link to the CDC's Tracking Network Public Portal from individual state public portals.	Required	Required if a secure portal exists
Maintain visual consistency among layout and format pages on a grantee's portal.	Required	Required if a secure portal exists
Provide a structured flow that links related information and data sources.	Required	Recommended if a secure portal exists
Comply with Section 508 standards.	Required	Required if a secure portal exists
Display the National Tracking Network graphic element	Required	Required if a secure portal exists
Provide access to data query forms, functions, and/or screens within 3 clicks of the portal home page.	Required	Required if a secure portal exists
Provide a path to return easily to previous screens.	Recommended	Recommended if a secure portal exists
Support the means to generate visual displays of data, including maps, charts, and tables.	Required	Recommended if a secure portal exists
Provide the ability to display both counts and rates on a map.	Required	Recommended if a secure portal exists
Use standard color pallets from proven scientific research for color sections charts and maps.	Required	Recommended if a secure portal exists
Provide the <u>capability</u> to	Required	Required if a secure

Element	Public Portal	Secure Portal
combine multiple appropriate data sources in a single results set.		portal exists
Ensure that portal provides for the most detailed level of data available and allowed	Required	Required if a secure portal exists
Provide the ability to dynamically generate reports based on user input.	Required	Recommended if a secure portal exists
Analysis, Visualization, and Reporting		
Provide users the ability to interact with resultant displays (i.e. sorting columns on tables, zoom/pan maps, etc.)	Recommended	Recommended if a secure portal exists
Provide users the ability to see alternate views of the information (i.e. export, quick reports, etc.)	Required	Recommended if a secure portal exists
Data Content and Discovery		
Provide access to environmental, exposure, and health effect data. At a minimum, includes data/content outlined under the cooperative agreement and CDC Tracking standards for NCDM.	Required	Required if a secure portal exists
Provide access to restricted environmental, exposure, and health effect data.	N/A	Recommended if a secure portal exists
Establish clear categories to facilitate data browsing and discovery in order to guide users to nationally consistent data and measures and other information	Required	Recommended if a secure portal exists
Documentation		
Provide a set of Frequently Asked Questions (FAQ).	Required	Required if a secure portal exists
Provide clear definitions of terms.	Required	Required if a secure portal exists
Provide on-line	Required	Required if a secure

Element	Public Portal	Secure Portal
documentation.		portal exists
Provide a phone number or email address that users may use to get additional information or clarification.	Required	Required if a secure portal exists
Metadata		
Allow for the discovery of data by <u>searchable</u> metadata using the Tracking Metadata template for all data available on the grantee's portal.	Required	Recommended if a secure portal exists
Allow access to metadata for available data sets	Required	Required if a secure portal exists
Secure Access		
Provide data security and privacy protection.	Required	Required if a secure portal exists

Michigan Environmental Public Health Tracking Network Implementation Plan (TNIP) - Volume 5: Objectives

Michigan Environmental Public Health Tracking Network Overview

The Michigan Environmental Public Health Tracking Network will collect, integrate, analyze, interpret, and disseminate data from environmental hazard monitoring, human exposure, and health effects surveillance. The goal of the Michigan Tracking Network, which will result from increased awareness of the geographic distribution of and links between exposure to environmental hazards and human health, is improvements in health status and quality of life for Michigan residents.

Objectives of the Michigan Tracking Network include:

- To provide health, population, and environmental data in one easy to find location.
- To inform the public on key environmental health indicators and their geospatial and temporal distribution.
- To improve public health through education about environmental hazards, exposure to those hazards, and health effects potentially related to exposure to environmental hazards.
- To provide policy makers and public health officials information in order to make decisions about where to target environmental public health assistance and interventions.
- To help health practitioners and researchers learn more about health conditions related to the environment.