King County

Attachment A

Information Technology Business Case

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Project Title:	**CD-Imms Information System Upgrade**
Project Subtitle:	**Analyzing business needs and upgrading software**
Project Number: (If Existing Project)	**377225**
Date of Submittal:	**3/10/2009**
Agency/Department:	**Public Health CD-EPI**
Business Sponsor:	**Gary Johnson, Prevention Division Manager**
Prepared By:	**Kurt Wuellner and Tao Sheng Kwan-Gett, MD MPH**

Project Primary Benefit Alignment: [Reference: KC IT Goal Definitions]

	Accountability/ Transparency	Customer Service/Access	Efficiency	Risk Management
Check one only	☐	☐	☒	☐

Business Outcomes: *(Check all that apply)*

Efficiency	☐	Offers a positive return on investment (ROI)
	☒	Improves productivity and/or reduces future expenditures
Public Access & Customer Service	☐	Improves accessibility of public records
	☐	Improves accessibility to county services, resources, and/or officials
	☒	Improves the quality and/or usability of internal and/or external county services
Transparency and Accountability for Decisions	☒	Makes decisions and decision-related materials more easily available
	☒	Supports ability to track long-term outcomes
	☒	Supports visibility into the decision process
	☐	Supports input and feedback related to countywide decisions
Risk Management	☒	Intended to improve security and provide legally mandated services and basic operations support
Other	☒	Fulfill regulatory requirements
	☐	Provide tactical agency operational improvements
	☒	Provide information gathering tool for pandemic and other emergency preparedness activities

Technical Outcomes: *(Check all that apply)*

Increases architectural flexibility	☒	Utilizes open standards
	☒	Employs web-based technologies
	☒	Utilizes commercial off the shelf software
	☒	Leverages and/or extends integration architecture
Improves data management	☒	Increases data security
	☒	Increases data privacy
	☒	Improves data accuracy
	☒	Reduces data redundancy
Improves technology operations	☒	Enhances system reliability
	☒	Consolidates hardware/software
	☒	Standardizes or streamlines existing operations
Other	☐	

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Project Type: *(Will Help Determine PRB Review Plan)*

	Implementation	Business Case/Study/Plan	IT Equipment Replacement
Check One Only	☒	☐	☐

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Project Phase: (Underline project phase applicable to this submittal)

Budget Request:

☐ **Conceptual Review - Provide a concise, informative, high level summary for sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, and 2.0. Conceptual review summaries should be 1-3 pages only.**

☐ **Formal Budget Request**

Project Review Board Business Case Deliverables

☒ **Phase II - PRB Business Case Presentation**

- **Update for any major changes to scope, schedule, and budget if significantly different from the Budget Request Business Case.**
- **OMB and agency to confirm baseline (current)/ target measurements and identify and plan for future budget actions prior to PRB review.**

☐ **Other (Describe Phase as applicable)**

- **Update for any major changes to scope, schedule, and budget if significantly different in order to inform or respond to PRB request.**

Change Summary from previous submittals of Business Case:

1) Describe any important or significant changes to project scope, schedule, and budget from previous version of business case submittal.

1. Scope has shifted from purchase of a commercial off-the shelf (COTS) product to upgrade of existing database 2. (Budget) was further developed and reduced, and 3. Section 2 on Vendor selection has been eliminated.

2) Describe any important or significant changes to expected benefits or ongoing O&M costs and other operational impacts from previous version of business case submittal.

Through utilization of internal IT staff to upgrade existing database and not purchasing COTS system, the budget has been significantly reduced to $127,635

Information Technology Business Case

Executive Summary

The first phase of the two-phase project was to identify the business needs for CD-Imm's information system and evaluate different upgrade options to satisfy those needs. A public health informatics consultant conducted observations, interviews, and focus groups with CD-Imms staff to identify the necessary capabilities the system must have to manage daily communicable disease information. With the results of this analysis, the consultant then evaluated the commercial off-the-shelf (COTS) systems available for communicable disease investigation, and assessed their usefulness and affordability considering the section's needs and available resources. Based on the information provided by the consultant, we decided not to purchase a commercially available system, but to instead pursue in-house custom upgrades to our communicable disease (CD) Database. This option allows us to get just the custom functionality we need while maintaining the flexibility to interface to any system the State selects in the future.

A major factor that influenced this decision was the status of the Washington Department of Health's (WA DOH) online reporting tool for communicable disease, the Public Health Issue Management System (PHIMS). CD Imms is required to report cases to WA DOH through PHIMS. But because PHIMS does not accept electronic data transfer from external systems, data is "double entered" by CD Imms staff into the CD Database and PHIMS. Because of PHIMS' functional limitations, WA DOH has indicated that PHIMS will be discontinued in the near term, but has yet to disclose what its replacement will be. Therefore it seemed risky for Public Health to invest a lot of resources in a new COTS system without knowing whether that system would be aligned with a future WA DOH communicable disease database.

In Phase II, PHSKC CD-Imms enlisted the help of a public health informatics consultant to assess the strengths and benefits of communicable disease database (CD database) upgrade options. The CD database alternatives evaluated were:

- **Maven, a commercial off-the-shelf system by Consilience Software currently in use in Massachusetts and North Carolina**. It is the most inclusive and polished product of all the commercial products, but carries the highest cost ($654,600 over 3 years, though this could probably negotiated down substantially given their desire to establish a market in Washington state). Although cost estimates for implementation and data migration are high, the expected quality of support for migration and training is also high. After initial implementation costs are covered, maintenance costs are comparable to other systems.
- **AtlasPH, another commercial system currently in use in California and Wisconsin**. Atlas has the potential to meet many of the section's needs, and due to its modular software licensing, the basic system can be obtained at a relatively low cost ($280,800 over 3 years). Its interface is the least well developed, however. It is likely that additional modules would be desired after the initial implementation, so those additional costs should be considered as well. The company's recent contract with the State of California suggests that the company is continuing to grow, but could possibly be overextended by its rapid expansion.
- **Trisano, an open source commercial system developed in Oregon and having its debut deployment in Utah this year**. In its current version the product lacks several features the CD-Imms Section hoped to gain. However its open source philosophy is attractive. It can be freely downloaded, and support costs are reasonable. If it became a commonly-used platform, local health departments could enjoy the benefits of sharing each other's modifications and experience. But as an early adopter, PHSKC would accept greater financial risk than those who adopt the system after it has matured through use in other environments.

- **Orpheus, the Oregon State Department of Health CD database.** This product is still in development and was not at a stage where it could be evaluated as rigorously as the other options. It has no licensing fees. Its disadvantages are (1) it does not have a web interface, unlike the above products have, and (2) it requires the purchase and installation of Filemaker, a desktop database that staff are not familiar with and which MIS does not support.

Migrating to any of the above systems incurs two substantial risks:

(1) WA DOH may require use of a different system in the future; it has indicated that PHIMS will be discontinued, but has not decided on a substitute- we want to avoid choosing one system, only to be required to migrate to a different product in a few years.

(2) Funding for a CD database beyond 3 years is uncertain, and all the above systems incur substantial maintenance fees.

We therefore recommend that we upgrade our current CD database. We have negotiated with MIS a set of upgrades that could be accomplished with available time and funding, focusing on

(1) Improving data quality, especially important in light of 5930 performance measures,
(2) Increasing efficiency (e.g., enable users to search all cases at once, rather than having to conduct separate searches in the enterics table, hepatitis table, foodborne illness table, and invasive bacterial disease table),
(3) Usability for outbreak management and emergency response, and
(4) Laying the foundation for future electronic data exchange with WA DOH so that double data entry is not necessary

1.1 Problem Statement/Vision and Goals

Our current CD database that was developed in 1994 has exceeded its capabilities and abilities and is reliant on an unsupported platform. It will need to be upgraded to a supported platform so that additional functionality can be added. Below are a few of the problems with the current systems:

- Query and reporting tools are difficult to use.
- Does not allow us to easily share data securely with other sections within the health department (e.g., for isolation and quarantine)
- Architecture is not flexible enough and cannot be used for outbreak management, only for case reporting (currently, we have to create a separate MS-Access database for each outbreak investigation).
- To facilitate the goal of having the system utilized by the public and, private companies, the current system does not enable us to perform web-based data collection, time series graphs, and mapping.
- Not compliant with widely used systems such Public Health Information Network (PHIN) standards, a set of standards created by the Centers for Disease Control and Prevention (CDC) to facilitate the secure and accurate electronic exchange of confidential patient information.
- Is designed in such a way that use of resources is inefficient, thereby resulting in a slower response time in an outbreak scenario, and may compromise our ability to protect the public.
- The current system does not have the ability to capture foodborne illness investigations; which is a state mandated requirement. The proposed upgrade will address this deficiency.

Our vision is for an upgraded CD Database that will enable our section to fulfill our disease reporting mandate with systems that are more efficient, transparent, flexible, and able to adopt new technologies as they become available.

The second phase of the project will be limited exclusively to in-house development work on our CD Database. The first major milestone of the second phase will be to upgrade our system's front end to Visual Basic .NET (VB.NET) from Visual Basic 6, which became unsupported in March 2008.

Upgrading to VB.NET will then enable us to add new features and functionality that will increase the system's lifespan and functionality. Throughout the course of the project, CD Imms staff, along with a research assistant, will work collaboratively with developers at KCIT PH, directing the developers to complete several discrete system enhancements, each with a tangible and measurable endpoint. The enhancements will focus on implementing data entry rules to reduce errors and inconsistencies, updating columns and tables to reflect advances in laboratory diagnosis and case management, extending database search capabilities, improving the graphical user interface, and incorporating basic outbreak management capabilities. Each enhancement has been reviewed by KCIT PH staff, and their estimates of development time have been considered in our proposed project schedule. The end result of the project will be a CD Database that will have the reliability and familiarity of our present system, but with upgrades that extend its capabilities and increase the section's efficiency.

1.2 Overview / Background

Citizens, health care providers, and hospitals are required by law to report patients with any of 63 diseases or "notifiable conditions." CD-Imms is responsible for responding to those reports and investigating cases and outbreaks of communicable diseases of public health importance. In 2006 CD-Imms received more than 6,000 such reports and investigated 38 outbreaks. The CD database is the information system we use to store and analyze information from these reports and investigations. Typically we search similarities among cases such as demographics, location, organism, and behaviors or risk factors (e.g., foods, travel, exposure to other cases, injection drug use).

1.3 Constraints, Criteria, Dependencies & Other Issues

In addition to being able to store and manage large volumes of data, the system must be compliant with widely used and supportable technologies:

- Upgrades are dependent on changing the unsupported platform Visual Basic 6 to the supported VB.NET platform
- SQL development
- Public Health Information Network (PHIN) standards
- HIPAA Compliant.
- The ability to import and immediately access historical epidemiological data for analyses is another extremely important constraint.

1.4 Specific Business Objectives

The following table summarizes how this project corresponds to the Public Health Operational Management Plan (PHOMP).

Goal 1: Provide needed or mandated health services & prevention programs to address individual and community health concerns.	• Securely store reports of legally notifiable conditions • Improve the efficiency of information flow • Increase safeguards for protected patient information
Goal 2: Assess and monitor the health status of our communities.	• Store case investigation data in a form that can be analyzed for historical trends.
Goal 3: Prevent disease, injury, disability and premature deaths.	• Reliable data storage, analysis and report capacity allows efficient response to cases and outbreaks of disease. Proposed new system attributes allow more efficient, accurate and effective database function during outbreaks and improved outbreak response.

Goal 4: Promote healthy living conditions and healthy behaviors.	• Potential to integrate web based reporting of foodborne illnesses from the public
Goal 5: Control and reduce the exposure of individuals & communities to environmental or personal hazards	• Improved data system allows for better reporting of data to community partners regarding disease risks.
Goal 6: Employ and retain a skilled workforce that reflects the diversity of the community.	• Increase staff satisfaction by decreasing time for data entry and increasing time for analysis and intervention
Goal 7: Provide for timely, consistent and clear two-way communication tailored to the individual communities Public Health serves.	• Potential to allow collection of detailed case and outbreak reporting after hours, on weekends, and during holidays
Goal 8: Anticipate and respond to the public health consequences of local emergencies.	• Will provide functionality to support surveillance and response for pandemic influenza and other public health emergencies including outbreaks and biological terrorism.

The following table summarizes how this project corresponds to the Strategic Technology Goals and IT guiding principles.

Business Consideration	*Project correlation*
Vision *All county information and information-based services are cost-effective and easy to access and use by the public, by private companies, and internal staff through Web-based technologies with appropriate security and privacy controls.*	• New CD system will utilize web-based technologies • Potential to allow external customers to report cases directly via the web • Improved security with audit trails
Goals • Efficiency • Public Access and Customer Service • Transparency and Accountability for Decisions • Risk Management	• Mechanisms that allow for quality tracking and processing of notifiable condition reports • Ability to tailor data access permissions based on team role
Guiding Principles • Central review and coordination of IT. • IT enables effective and efficient service delivery. • IT standards. • Access to information and services. • Business process improvement. • Privacy and security.	• Password protection, user account management and audit trails ensure privacy and security • Visualization of communicable disease data such as maps and transmission network diagrams

1.5 Project Risks

Upgrading the CD Database carries the risks of

- As the role of the CD-Imms group expands in the coming years, there is a risk that this application may/or may not meet the needs of this expansion. This risk is reduced with the upgrade since it will provide the platform for future development as needs change.
- Some future features may be prohibitively expensive to develop.
- The CD-Imms section will need to rely on the availability of internal support.

1.6 Plan of Work, Approach, Timeline, Key Milestones

The second phase of the project, which will be limited exclusively to in-house development work on our CD Database, will be completed by December 31, 2009. The initial phase of the project will last from May 1st, 2009 through October 31st, 2009. The first major milestone of the second phase will be to upgrade our system's front end to Visual Basic .NET (VB.NET) from Visual Basic 6, which became unsupported in March 2008. Upgrading to VB.NET will then enable us to add new features and functionality that will increase the system's lifespan and functionality. Throughout the course of the project, CD Imms staff, along with a research assistant, will work collaboratively with developers at KCIT, directing the developers to complete several discrete system enhancements, each with a tangible and measurable endpoint. The enhancements will focus on implementing data entry rules to reduce errors and inconsistencies, updating columns and tables to reflect advances in laboratory diagnosis and case management, extending database search capabilities, improving the graphical user interface, incorporating basic disease outbreak management capabilities, and laying the groundwork for future electronic integration with WA DOH. Each enhancement has been reviewed by KCIT PH staff, and their estimates of development time have been considered in our proposed project schedule. The end result of the project will be a CD Database that will have the reliability and familiarity of our present system, but with upgrades that extend its capabilities and increase the section's efficiency.

- 2008: Informatics Assessment and Business Plan Development
  Deliverables: Assessment, Business Plan (including full Cost Benefit Analysis of all alternatives), & all required PRB and IT SDM documentation (including Charter)
- Early 2009: Coordinate response to King County PROVISO
  Deliverables: develop updated business case and cost benefit analysis, and develop the funding release requests for the RB supporting documentation.
- Summer 2009: Upgrade to existing CD database.
  Deliverables: Employ IT Senior Applications Developer to change database platform and begin prioritized updates. Employ, Research Assistant to develop specifications for further upgrades.
  Replace VB 6 Platform with VB.NET – October 31, 2009
  Allow the CD database to be searched by multiple fields – November 3
  Integrate Perinatal Hepatitis B Program database with CD database
  Create and implement outbreak management module
  Deliverables: Test results for new features, Training plan, all required PRB & IT SDM documentation, monthly status reports, & implementation plan
- Early 2010: Investigate potential use of CD Database to include web-based case reporting from external customers, review specifications for additional future upgrades, develop timeline for potential implementation of these upgrades.

1.7 Benefits and Other Impact

1.7.1 Customer Benefits and Other Impacts:

- CD-Imms primary customers include health care providers, health care facilities, citizens, and other public health agencies. The main upgrades that will affect these customers include:

- Enhanced HIPAA privacy protections
- More accurate data acquisition

- The community benefits from faster identification of clusters, outbreaks, and environmental sources of infection
- All customers including other agencies benefit from faster turnaround time for analyses with fewer errors to due incorrect data entry

1.7.2 Employee Impacts

- Upgrade of existing database will require less training
- No disruption of work for data transfer and training
- Increase efficiency by enabling epidemiologists to utilize a single outbreak management database, rather than creating multiple Access databases for each outbreak event.
- Improve speed and accuracy of data collection.
- Improve response time by streamlining data summaries and reports.

1.7.3 Business Process Benefits and Other Impacts

- As needed in an outbreak scenario, an upgraded CD database would permit other groups within the health department to access our data to manage issues such as isolation and quarantine and patient follow-up care.
- The current system does not have the ability to capture foodborne illness investigations; the proposed upgrade will address this deficiency.
- Integrate the Perinatal Hepatitis B and delete double data entry.
- Other benefits would include enhanced ability to calculate state mandated performance measures; more efficient workflow; and less error-prone data for epidemiologic analyses.

1.7.4 Technology Infrastructure Benefits and Other Impacts

- Updating the CD database would carry many infrastructure benefits, for example: abandonment of legacy systems for which technical support will become more difficult to obtain; decrease in double data entry; adoption of a web-based interface that reduces the need for applications to be installed and supported.

1.7.5 Cost Benefit Analysis

1.7.6 Alternatives and feasibility

- **Do not upgrade the CD database, and continue using it as it is.**
  - Pro: No costs involved
  - Con: Problems identified are not resolved
- **Seek a 100% fully vendor-produced solution.** Purchase and subscribe to a commercial CD database product. Depending on costs, there may be an option to have application and data hosted on the vendor's servers.
  - Pro: Solution is integrated rather than piecemeal
  - Pro: No costs involved for hardware purchase
  - Pro: Lower costs involved for IT support if data and application are hosted elsewhere
  - Pro: Detailed development of requirements has already been done
  - Con: Possible support issues
  - Con: Training time and costs for CD staff
  - Con: Annual fees for licensing and server hosting
  - Con: May not be compatible with DOH system

- **Use the Washington Dept. of Health PHIMS application:**
  CD-Imms has been reporting notifiable conditions to WA DOH using PHIMS since November 2007. This is a web-based database originally intended to be used as a case management and reporting tool. However, there are several business needs specific to CD-IMMS that PHIMS currently does not address:
  - immediate access to historical data for ad-hoc queries and analysis
  - user-definable custom variables (necessary for outbreak investigations)
  - web-based data collection from hospitals and health care professionals
  - mapping tools
  - graphing tools.

  Of these shortcomings, WA DOH is working to address the issue of access to historical data, but, as far as we are aware, they do not have plans for adding capabilities that would satisfy the other business needs outlined above.

  For a detailed explanation of PHIMS and its interface with CD-Imms, please go to:

  http://cdc.confex.com/cdc/phin2008/webprogram/Paper17321.html

- **Our recommendation is to upgrade the existing CD database and develop system enhancements in house.** Such enhancements will be separate applications such as outbreak management, web-based data collection, mapping tools and graphing tools.
  - Pro: Applications would be highly customized to our needs
  - Pro: Internal support readily available
  - Pro: Less training needed and limited disruption of work
  - Pro: Allows flexibility to adapt to DOH system in the future
  - Con: Requires IT developer costs and time
  - Con: Requires platform replacement to accomplish upgrades

2.0 Cost Estimates Guidelines and Key principles

Phase One: Informatics Assessment and Business Plan (completed 12/31/2008)
Total **$70,000** (was funded through DOH 5930 in 2008) Solution Costing Estimates

Phase Two: Implementation of business plan
Total **$116,032 (funded through DOH 5930, Rev. Acct. 47236 in Org/Proj 8055/H00038)**
$11,603 10% contingency (funded through Public Health – Seattle & King County in-kind support)

Washington State DOH funding is anticipated as the primary funding source for this upgrade. Additional resources could be requested through current and/or future CD grant applications that would utilize the database, but such requests would not provide the majority of the funding.