

Development of Surveillance Standards for Veterinary Services Data in the United States (U.S)

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Animal Health surveillance systems are increasingly dependent on the storage of massive quantities of information that can be accessed quickly and efficiently. Standardization and pre-planning minimize problems resulting from multiple data sources by allowing for efficient collection, storage, and access of information needed to answer questions about animal disease. Additionally, standards ensure that surveillance efforts meet pre-established objectives.

Standards for Veterinary Services were developed in three sections. Section 1 addresses standards for the construction and operation of a surveillance system to assist planners and managers in considering the specific objectives, design strategies, reporting systems, implementation methods, and long-term maintenance of the system. These guidelines ensure that data collection, organization, and analysis are considered before surveillance is implemented. Further, they allow for periodic evaluation of the surveillance system to assure that it is providing the type and quality of information necessary to achieve its purpose and objectives. Section 2 provides standard formats and business rules for data categories and elements. These data standards provide a convenient reference of predefined elements to be considered in surveillance database development and also ensure that data can be easily shared among different information systems. Section 3 identifies standards for data system management, including data storage, accessibility, security, confidentiality, and quality control.

The final standards product includes expertise and contribution from groups within and outside of Veterinary Services. The format of the manual is designed for easy and rapid access and will be reviewed and updated on an ongoing basis.

Introduction

Animal health surveillance systems of the 21st Century depend increasingly on the collection and storage of large quantities of data for quick, efficient access. However, collecting massive amounts of data is not synonymous with collecting useful and timely information, and is an inefficient and unreasonable substitute for well-planned surveillance. Planning surveillance systems in a standardized and methodical manner is essential to assure that the most appropriate information is collected and available to address the pertinent issues at the minimum cost.

Even when appropriate information is collected, its use can be complicated by storage in multiple databases, which may be administered by groups spanning Federal and State government agencies, industry, and other non-government organizations. Further, data of poor quality or consistency are often unreliable and may not provide useful information. For example, a database without standardization and quality control measures could easily report the data for a bovine disease with the species marked as "turtle" and the gender of breeding animals listed as "castrated." Deriving conclusions and analysis from this information would obviously be difficult. To address these difficulties, analysts at USDA Veterinary Services (VS) Centers for Epidemiology and Animal Health (CEAH) have developed a set of standards for use in the databases that collect and store animal disease information in the United States. These standards include the potential to maximize the information gained from collected data because the data can be integrated with different systems and used for purposes that arise after the implementation of the surveillance system.

Chapter 1: Standards for the Key Components of a Surveillance System

The first chapter of the surveillance standards considers specific objectives, design strategies, reporting systems, implementation methods, and long-term system maintenance. The guidelines require that objectives of the surveillance system are predefined, and that the collection, organization, and analysis of appropriate data are considered before implementation. Further, the guidelines allow for review and evaluation so that the appropriate type and quality of information continue to meet the stated objectives. The

standards are intended to assist epidemiologists and surveillance experts developing new surveillance systems or evaluating and improving existing systems. The guidelines provide an overview and generalized framework for details likely to be considered for comprehensive and efficient surveillance. The guide is not intended to be prescriptive or to define mandatory items for inclusion by surveillance architects, but instead to provide a useful tool to expedite development and review processes.

Table 1. Summary of Standards For Key Components of a Surveillance System

Concept	Standards:
Introductory Information	1.1 Disease Description
	1.2 Purpose and Rationale for Surveillance
	1.3 Surveillance Objectives: Principal Uses of Data for Decision-Making
	1.4 Expected Outcomes: Products, Decisions and Actions
	1.5 Stakeholders and Responsible Parties
Population Description and Sampling Methods	1.6 Population Description and Characteristics
	1.7 Case Definitions
	1.8 Data Sources
	1.9 Sampling Methods
Analysis, Reporting, and Presentation	1.10 Data Analysis and Interpretation
	1.11 Data Presentation and Reporting
Implementation, Budget, and Evaluation	1.12 Surveillance System Implementation: Priorities, Timelines, and Internal Communications
	1.13 Budget
	1.14 Surveillance Plan Performance Metrics
	1.15 Surveillance System Evaluation

Chapter 2: Data Concepts and Data Classes

Standards for data categories and classes provide guidelines on the type and format of data to be gathered. These standards offer two major benefits. The first is the convenience of predefined classes that developers can use for data variables. For example, a pre-made list of breed and species codes may be quickly indexed and include suggestions for parameters such as variable lengths, types, and business rules. The second benefit is ease of communication between different databases to allow integration of data with other information sources and analysis by different types of experts.

Animal health surveillance requires timely, accurate, and accessible data that facilitate analysis and reporting and contribute meaningful information for decision-making. Although surveillance databases are designed to collect specific data that will enable analysts to address the goals and objectives of a specific system, some data classes, or fields, are recorded in nearly all surveillance systems (e.g., dates, location information, species names, disease names, animal information, sample information, and others). The use of standards when capturing common data classes assures that the resulting databases not only provide data necessary to address system-specific objectives, but also for broader information inquiry and analysis.

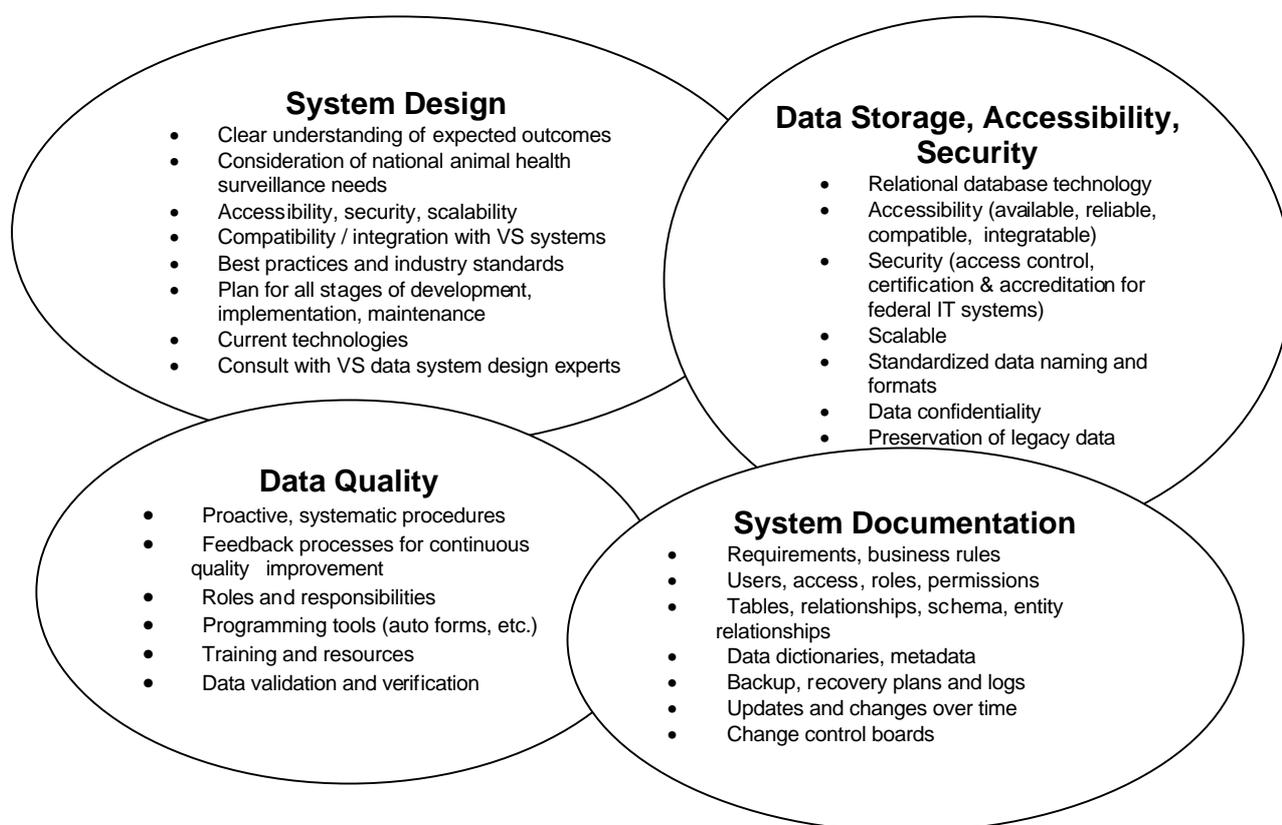
This chapter identifies commonly used and often essential data concepts and classes in animal health surveillance systems and provides standard specifications for recording these fields. This chapter may also serve as a useful "library" of common data classes to be considered when developing a data collection system for animal health surveillance purposes. Appendices at the end of this document provide specific codes for several commonly used data classes.

The data categories and classes described here do not include all fields needed to address the specific needs of a particular surveillance system, but provide a starting point for a data dictionary. Similarly, it is not expected that every data class listed will be useful for every surveillance system. Surveillance planners, data analysts, and database designers should determine their specific data needs and use the appropriate standards and specifications for their system. Business rules, entity relationships, and other "best practices" in the design and implementation of database systems are beyond the scope of this chapter, although these factors may significantly impact data quality and accessibility.

There are eight critical concept groups identified in chapter 2 for animal disease surveillance: Event, Subject, Population, Sample, Observation or Test Results Information, Premises, Person, and Geographic Information.

Chapter 3: Standards for Surveillance Database Systems

The third chapter of the standards document provides an overview of the considerations for designing, implementing, and managing animal health surveillance data systems. The chapter focuses on the key topics of (1) data system design, (2) data storage, accessibility, and security, (3) data quality, and (4) system documentation. Data system design standards assure that appropriate data are collected to meet the objectives of the surveillance system and that data are securely stored, accessible to analysts and decision-makers, and transferable to other data systems. Data systems must also be recoverable, reliable, and scalable. Data quality considerations for surveillance data systems should include not only inspection processes to find and correct data errors, but also systematic and proactive processes that ensure data quality. Chapter 3 also provides guidelines for system documentation and changes to the existing system as needed by changes to surveillance systems and technology.



Conclusion

The success of an animal health surveillance system depends largely on the availability of high quality and accessible data that can be easily and readily used for meaningful analysis and reporting. An efficient surveillance system begins with a well planned system that collects the appropriate data for the pre-defined objectives needed to achieve the purposes of surveillance managers. Additionally, management of the collected information requires database design structured to maintain common and often essential data concepts and classes in a format amenable to quality control procedures such as electronic communication, business rules, and standardized codes. Further, expert design of secure, accessible database systems; systematic procedures that assure data quality; and clear and efficient communication among a diverse group of professionals is essential to a successful and efficient surveillance system.