

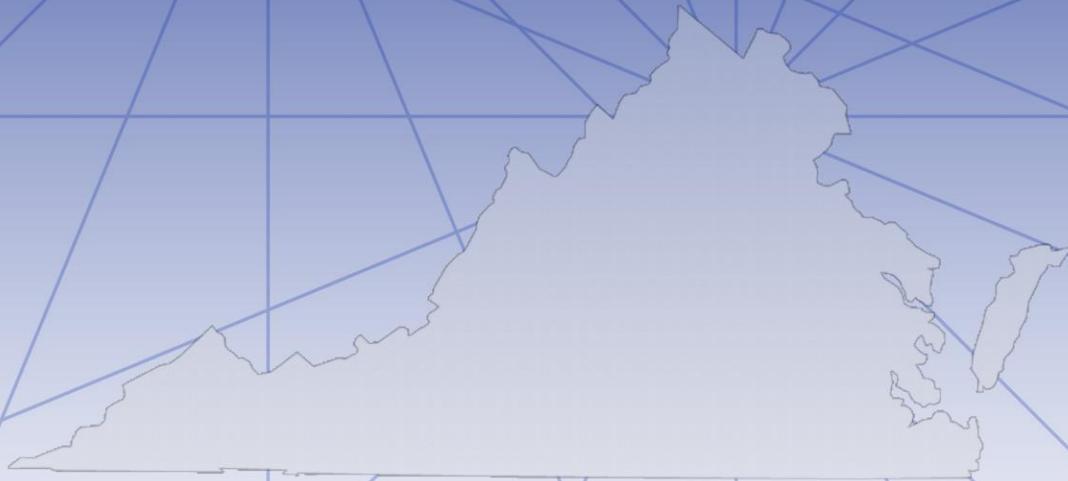
Virginia Information Technologies Agency



Commonwealth Data Standardization: Interim Plan

*Reported Pursuant to Item 427 of the
2012 Appropriation Act*

Virginia Information Technologies Agency



November 1, 2012

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Executive Summary

Item 427 C of the 2012 Appropriation Act requires the Secretary of Technology to develop data standards for information that is commonly used by state agencies. This report constitutes the initial plan required by the Item, which the Virginia Information Technologies Agency (VITA) has prepared on behalf of the Secretary of Technology. The final plan will be submitted in July 2013.

Background and Statutory History

The 2012 budget language is closely related to an Auditor of Public Accounts (APA) May 2012 audit, which found that only some of the data standards required by earlier legislation are in place. The APA also identified certain factors which they assert may have hindered data standards development, including inconsistent leadership under the previous governance structure and a lack of staff.

Another disincentive also may be created by the lack of clarity regarding whether agencies can legally exchange data. To further the development of data standards, the APA's 2012 audit indicated that VITA should now be responsible for all data standardization efforts.

As part of the final plan required by Item 427 C, VITA will propose a development process and examine several related issues, including

- whether changes are needed to VITA's statutory authority or staffing resources;
- how the relative subject matter expertise within VITA and other agencies can be leveraged, while balancing their respective responsibilities;
- what governance model for data standardization is most appropriate; and,
- the degree to which a combination of data standards and data exchange standards should be used, since statute provides for both.

Business Uses of Data and Data Standardization

Data standardization enforces a common set of meanings, vocabularies and data elements for the exchange of information across diverse systems. Standardizing data enables reuse of data elements, reduces data redundancy and limits unnecessary variability in data content. In turn, data standardization allows government to achieve greater efficiency in data management and a higher return on information technology investments.

To meet the requirements of Item 427 C, VITA will examine several strategies for data standardization and implementation of standardized data. First, VITA will explore the two primary methods for data standardization: data standards and data exchange standards. Both methods establish agreements on data elements, definitions and specifications for enterprise data. However, data standards define the structure of data at rest within a system, while data exchange standards define how data will be transformed during data extraction and sharing between systems. VITA's analysis will determine which projects cited in the Item may be most appropriate for data standards and which may be most appropriate for data exchange standards.

Second, VITA will explore whether Web services and services offered in the Services Oriented Architecture (SOA) environment may be a viable alternative to data standardization to achieve the business objectives established in the Item. Web and SOA services enforce shared meanings, vocabularies and data elements by publishing data through a standardized Web-based interface. Using Web and SOA services, agencies no longer have to store their own data but may design their applications and solutions to “call” to the data published in the service. This enforces the use of standardized data across systems consuming the service, reduces storage of redundant data, and ensures that the data are the most up to date, since the Web and SOA services are maintained by the data-owning agency.

Third, VITA will build upon its experience in implementing the Enterprise Data Management (EDM) solution under the Electronic Health and Human Resources (eHHR) Program as a means of standardizing data through the use of a shared services platform. The EDM solution will feature “hubs” for persons and organizations, with each hub maintaining matched sets of records from agency source systems. Agencies onboarded onto the EDM solution will be able to reuse core data elements for person and organization data based on the matched set of records for each entity. The core data elements will be standardized based on the adopted EDM Person Data Exchange Standard and the forthcoming EDM General Organization Data Exchange Standard.

Current Status of Data Standardization

The APA noted in its May 2012 audit report that VITA had made progress toward data standardization. The progress may be categorized into three primary areas:

- data standardization in compliance with statutory requirements pursuant to the 2008 Appropriation Act;
- data standardization in support of enterprise data-management solutions funded under the Electronic Health and Human Resources Program; and,
- data standardization in line with industry-wide efforts in the health IT domain. (To date, the Secretary of Technology has adopted data standards for two of the seven business areas cited in the 2008 Appropriation Act. In addition, the Secretary has adopted 91 data exchange standards as Commonwealth standards in other domains.)

In addition to the progress made on data standardization, the APA recognized VITA’s effort to establish a data governance function within its Enterprise Solutions and Governance Directorate. Under the new Commonwealth Data Governance (CDG) team, VITA has initiated an overhaul of the Commonwealth’s Enterprise Information Architecture (EIA) governance and oversight framework. This framework consists of policies, standards and guidelines for data standardization and governance activities.

Since the APA’s report, the Secretary of Technology has adopted new language for the Commonwealth’s Enterprise Architecture Policy 200-02. The new language provides a more robust definition of EIA and establishes an EIA maturity model to guide the Commonwealth toward a desired future state in four EIA program areas: data governance, data standardization, data asset management and data sharing. VITA will implement the new EIA elements in the EA policy through a Commonwealth Data Strategy. VITA has integrated into its Corrective Action Plan (CAP) strategies, aligned with APA’s recommendations, to achieve the existing data-standardization

requirements pursuant to the 2008 Appropriation Act and the new requirements codified in the 2012 Appropriation Act.

Item 427 C.1 Element

In compliance with Item 427 C.1, and on behalf of the Secretary of Technology, VITA will work with Cabinet Secretaries and their agencies to develop a strategy for standardizing the types of data outlined in the Item: “...*citizen-centric data, personnel, recipient information, and other common sources of information gathered by the Commonwealth and in use by systems set out within this item.*” Projects cited in the Item will be reviewed by VITA’s Commonwealth Data Governance, IT Investment Management and Project Management Division staff to assess whether the data managed in the system would be in-scope for the standardization requirements.

A core element of the implementation strategy will be to migrate systems determined to be in-scope to the Item, and not already designed based on an adopted standards, into conformance with the National Information Exchange Model (NIEM). NIEM started in 2005 as an outgrowth of the U.S. Department of Justice's Global Justice XML Data Model project and has become a collaborative partnership across levels of government and private industry. NIEM has been endorsed by the National Association of State Chief Information Officers (NASCIO) as the set of standards and governance structure for agencies at all levels of government to adopt for exchanging citizen-centric data. VITA will apply the NIEM cost model and project-planning model to estimate the fiscal impact and projected schedule for NIEM implementation. VITA will present the results from the cost estimation and project planning in July 2013 as part of the final plan submittal pursuant to the Item.

Item 427 C.2 Element

In compliance with Item 427 C.2, and on behalf of the Secretary of Technology, VITA will work with Cabinet Secretaries and their agencies to develop a strategy for (1) determining which standards implemented by projects cited in the Item should be adopted as Commonwealth standards and (2) ensuring that the projects cited in the Item comply with adopted data standards, data exchange standards or alternate strategy for implementing standardized data.

This strategy will involve coordination between VITA Commonwealth Data Governance, IT Investment Management (ITIM) and Project Management Division (PMD) staff. Projects cited in the Item will be reviewed by ITIM and PMD staff to assess whether the data managed in the system may be in-scope for data standardization or alternate strategy. In-scope systems then will undergo a full review by CDG staff to identify which are implementing standardized data. In-scope systems implementing standardized data will be evaluated by CDG staff to determine which standards may be adopted as Commonwealth standards.

VITA will apply a cost-estimation model and project-planning model to estimate the fiscal impact and projected schedule for implementing the standardization strategies required under Item 427 C.2. VITA will present the results from the cost-estimation and project planning in July 2013 as part of the final plan submittal pursuant to the Item.

Background and Statutory History

Item 427 C of the 2012 Appropriation Act requires the Secretary of Technology to develop data standards for information that is commonly used by state agencies. To provide structure to this effort, the Item requires the Secretary to submit an initial plan for data standards development by November 1, 2012, and a final plan by July 1, 2013. This report constitutes the initial plan, which the Virginia Information Technologies Agency (VITA) has prepared on behalf of the Secretary of Technology.

The 2012 budget language is closely related to an Auditor of Public Accounts (APA) May 2012 audit, which assessed the status of data standards development. The APA's 2012 audit measured the Commonwealth's progress relative to the requirements contained in earlier legislation, and to the recommendations made by the APA in a November 2009 review of this topic. Because the APA's audits provide background into the concerns that led to Item 427 C, and contain recommendations for which a corrective action plan has been developed by VITA, this report addresses the budget language and the APA's audits whenever possible.

The APA's 2012 audit notes that only some of the data standards required by earlier legislation are in place, and finds that the lack of data standards has prevented the Commonwealth from achieving certain business objectives. The legislation referred to by the APA includes the 2008-2011 Appropriation Acts, and requirements enacted by the General Assembly in 2009 that appear in § 2.2-1115.1 of the *Code of Virginia*. As noted by the APA, the data standards required by this legislation "promote the efficient sharing of information among entities," and their absence "may make it difficult to share or analyze data" across agencies. The APA also states that the presence of "data standards also can reduce future system development costs, since development teams do not duplicate efforts to define common data."

As part of both audits, the APA identified certain factors that may have hindered the implementation of data standards. Foremost among these were "confusion over leadership" and the availability of staff. In its 2009 audit, the APA noted that although the Commonwealth's Chief Applications Officer (CAO) was assigned "all the powers necessary to direct the Commonwealth's efforts" to develop data standards, the requirements of earlier Appropriations Acts had not been met. (At that time, the CAO was a contracted employee who reported directly to the Governor.) The 2009 audit also noted that staff resources requested by the CAO had not been provided, but that the CAO should ensure that needed staff was committed by the five agencies directed by the Appropriation Act to jointly develop data standards.

The APA's 2012 audit reiterated these concerns, and noted that state agencies that are statutorily assigned the responsibility to develop data standards may face disincentives that limit their efforts. Practically speaking, the APA observed that data standards development "creates a burden on agencies because they must allocate resources to complete the data standard, resulting in increased costs and additional work for the agency." Another disincentive also may exist, however, and

be equally powerful. If agencies are not legally permitted to exchange data with other agencies, the return on investment from data standards development may appear to be low.

At the present time, a lack of clarity exists regarding whether agencies can legally exchange data. Moreover, if legal barriers exist, whether from state or federal statutes or regulations, then state agencies may not be incentivized to dedicate limited staff to data standardization efforts. A salient example of these barriers is provided by the electronic Health and Human Resources (eHHR) Program, within which several IT projects are underway with the goal of modernizing several public and medical assistance programs. A key aspect of the eHHR program is the inter-agency exchange of data to limit duplication of effort and prevent fraud and abuse. At the present time, the Department of Social Services (DSS) provides eligibility information to the Department of Medical Assistance Services (DMAS). This data exchange has been permitted for several decades by federal law and regulation, and is reflected in Virginia's statutory and administrative codes.

The eHHR program is attempting to improve this process in part by using VITA's Enterprise Data Management system to allow DSS and DMAS staff to match data between their respective systems and also use DMV data to verify the identity of applicants. Since the time of the APA's 2012 audit, however, several legal barriers have been identified at the state level, which appear to prohibit DMV and VITA staff from accessing, viewing or using DSS and DMAS data. To the extent these barriers exist in the eHHR program, other IT projects, or business processes, data exchanges may be curtailed and a strong disincentive to create data standards may exist.

To further the development of data standards, the APA's 2012 audit indicated that VITA now should be responsible for all data standardization efforts. Specifically, the APA recommended that VITA assume "the authority and responsibility to identify and develop data standards because agencies will not likely volunteer to complete them, especially without sufficient resources to do so." The APA based this recommendation in part upon the statutory duties for data standardization already assigned in the *Code of Virginia* to the Chief Information Officer of the Commonwealth (CIO) and to VITA, but also to ensure a single entity is responsible for this process. The CIO is responsible for developing "statewide technical and data standards for information technology (IT) and related systems" (§ 2.2-2007). VITA is assigned similar responsibilities for developing "statewide technical and data standards for information technology and related systems to promote efficiency and uniformity," and directing "the establishment of statewide standards for the efficient exchange of electronic information and technology [emphasis added]" (§ 2.2-2010).

As part of the final plan required by Item 427 C, VITA will propose a process designed to ensure data standards are developed and implemented, and which responds to the requirements of the budget language and the APA's recommendations. As part of this, VITA will examine several related issues, including whether any changes will be needed to VITA's statutory authority or staffing resources to ensure that data standards are developed. Because the APA is

recommending that VITA be the single entity responsible for data standardization, VITA will assess how the relative subject matter expertise within VITA and other agencies can be leveraged while balancing their respective responsibilities. For example, the Department of Accounts (DOA) is the subject matter expert with regard to financial accounting and control, and may be in a better position than VITA to determine what standards are appropriate for these types of data. Moreover, the Comptroller already has the responsibility and statutory authority to “direct the development of a modern, effective, and uniform system of bookkeeping and accounting” and ensure it is adopted by state agencies (§2.2-803).

The proper governance model, including the role of the Secretary of Technology, who was statutorily designated as the Commonwealth’s CAO in 2010 (Chapters 136 and 145 of the 2010 *Acts of Assembly*), for data standardization also must be considered. Lastly, VITA will assess the degree to which a combination of data standards and data exchange standards should be used, since statute provides for both. As discussed in the next section of this report, standards for data at rest (data standards) and in motion (data exchange standards) each have relative benefits.

Business Uses of Data and Data Standardization

"Government effectiveness and citizen centric government services require effective cross line of business collaboration and communication. Use of national standards will avoid redundant investment and unnecessary variation."

NASCIO, April 2011¹

Commonwealth agencies increasingly work across organizational boundaries and levels of government to achieve business objectives. These enterprise relationships depend upon information exchanges to ensure operational effectiveness. For example, the Virginia Department of Social Services (VDSS) Division of Family Services shares data with its partners at the federal, state and local level to monitor performance on child welfare and related outcomes. Besides the obvious need to comply with strict security and privacy regulations, exchanges of information between multiple systems depend upon the standardization of data agreements by participants on common data elements, definitions and specifications for the exchange.

As information exchanges among governmental and non-governmental partners become more prevalent, a trend has emerged toward adoption of national or international standards. In the health domain, adoption of Health Level 7 (HL7) standards for messaging, data vocabularies, electronic medical records and electronic laboratory records exemplifies this trend. Similarly, in public safety, law enforcement, human service and other government domains the NIEM has become the set of standards endorsed by NASCIO for state government.

Data standardization enforces a common set of meanings, vocabularies and data elements for the exchange of information across diverse systems – referred to in the industry as *semantic interoperability*. Standardizing data to achieve semantic interoperability enables reuse of data elements, reduces data redundancy and limits unnecessary variability in data content. In turn, data standardization allows government to achieve greater efficiency in data management and a higher return on IT investments.

To meet the requirements of Item 427 C, VITA will examine several strategies for data standardization and implementation of standardized data. A summary of the potential strategies has been provided in **Figure 1**. First, VITA will explore the two primary methods for data standardization: data standards and data exchange standards. Both methods establish agreements on data elements, definitions and specifications for enterprise data. However, data standards define the structure of data at rest within a system, while data exchange standards define how data will be transformed during data extraction and sharing between systems. VITA's analysis will determine which projects cited in the Item may be most appropriate for data standards and which may be most appropriate for data exchange standards.

¹ NASCIO. 2011. "NASCIO Recommends State Government Adopt the National Information Exchange Model (NIEM) to Enable Government Information Sharing." Press Release Issued April 28, 2011. Lexington, KY: NASCIO.

Second, VITA will explore whether Web services and services offered through the Services Oriented Architecture (SOA) environment may be a viable alternative to data standardization to achieve the business objectives established in the Item. Web services enforce shared meanings, vocabularies and data elements by publishing data through a standardized Web-based interface. For example, the Department of General Services (DGS) publishes vendor data via a Web service, allowing agencies to consume vendor information directly from the source. Using this Web service, agencies no longer have to store vendor data but may design their applications and solutions to “call” to the data published in the service. This enforces the use of standardized data across systems consuming the service, reduces the storage of redundant data, and ensures that the data are the most up to date since the Web service is maintained by the data-owning agency.

Third, VITA will build upon its experience in implementing the Enterprise Data Management (EDM) solution under the eHHR Program as a means of standardizing data through the use of a shared services platform. The EDM solution will feature “hubs” for persons and organizations, with each hub maintaining matched sets of records from agency source systems. Agencies onboarded onto the EDM solution will be able to reuse core data elements for person and organization data based on the matched set of records for each entity. The core data elements will be standardized based on the adopted EDM Person Data Exchange Standard and the forthcoming EDM General Organization Data Exchange Standard.

Figure 1. Strategies for Achieving the Item 427 Requirements

Potential Strategy	Definition	Example
Data Standards	A uniform structure for storing, managing and maintaining data in a database or other type of data-management system.	The Department of Human Resource Management (DHRM) requires Commonwealth agencies to implement in their data systems uniform definitions for each data element (i.e., field name, variable type, variable length and other specifications) relating to employee and position information.
Data Exchange Standards	A set of rules articulated in a standardized schema for transforming data from a source system into a target system or format. Types of exchanges include direct system interfaces, real-time integration, batch loads, flat files, etc.	The Virginia Department of Health (VDH) and the DGS, Division of Consolidated Laboratory Services, implement HL7 data exchange standards to define how data from lab reports will be transformed and shared through a variety of electronic interfaces.
Web Services	Web-based services and services offered within the Services Oriented Architecture (SOA) environment designed to dynamically share data with other applications, with the data standardized in the host service.	DGS publishes vendor data via a Web service, allowing agencies to consume vendor information directly from the source rather than having to store the data in a redundant data system.
Enterprise Data Management (EDM) Solutions	A platform for matching records from multiple source systems to establish a matched set for each entity.	VITA will implement an EDM solution built on the IBM Initiate platform that will support the matching of person and organization records from across Commonwealth agency source systems based on an adopted data exchange standard.

Current Status of Data Standardization

The APA noted in its May 2012 audit report that VITA had made progress toward data standardization. The progress may be categorized into three primary areas: (1) data standardization in compliance with statutory requirements pursuant to the 2008 Appropriation Act, (2) data standardization in support of enterprise data-management solutions funded under the eHHR Program and (3) data standardization in line with industry-wide efforts in the health IT domain. To date, the Secretary of Technology has adopted data standards for two of the seven business areas cited in the 2008 Appropriation Act. In addition, the Secretary has adopted 91 data exchange standards as Commonwealth standards in other domains. A report of adopted Commonwealth standards has been provided in **Appendix 1**.

As Appendix 1 shows, two of the adopted Commonwealth standards, the Procurement Vendor Standard and Employee Identification Standard, address the statutory requirements of the 2008 Appropriation Act. Another, the EDM Person Data Exchange Standard, establishes how data relating to persons will be used for matching purposes in the VITA shared services platform, funded under the eHHR Program. The remaining standards were adopted in health IT to enable Commonwealth agencies to more efficiently exchange health information. The Commonwealth's Health IT Standards Advisory Committee (HITSAC) played an integral role in the development and adoption of the standards for the eHHR Program and in the health IT domain. The EDM Person standard and the health IT standards were adopted based on HITSAC recommendations.

In addition to the progress made on data standardization, the APA recognized VITA's effort to establish a data governance function within its Enterprise Solutions and Governance Directorate. Under the new Commonwealth Data Governance (CDG) team, VITA has initiated an overhaul of the Commonwealth's Enterprise Information Architecture (EIA) governance and oversight framework. This framework consists of policies, standards and guidelines for data standardization and related governance activities. Since the APA's report, the Secretary of Technology has adopted new language for the Commonwealth's Enterprise Architecture Policy 200-02. The new language provides a more robust definition of EIA and establishes an EIA maturity model to guide the Commonwealth toward a desired future state in four EIA program areas: data governance, data standardization, data asset management and data sharing. VITA will implement the new EIA elements in the EA policy through a Commonwealth Data Strategy, which was under development at the time of this report.

Despite this progress, and as stated by the APA in its May 2012 audit report, VITA recognizes that significant work remains to achieve the business objectives of Commonwealth-wide data standardization. VITA has integrated into its Corrective Action Plan (CAP) strategies, aligned with APA's recommendations, to achieve the existing data standardization requirements pursuant to the 2008 Appropriation Act and the new requirements codified in the 2012 Appropriation Act. **Figure 2** provides a cross-walk between VITA's CAP and the APA recommendations in the audit report. A copy of the VITA CAP has been provided in **Appendix 2**.

Figure 2. VITA Corrective Action Plan (CAP) Alignment with APA Recommendations

VITA CAP Action	CAP Action Description	APA Recommendation
Item 427 Plan	The Item 427 Plan (this document) will establish the implementation strategy to be used by VITA to meet the requirements, as set out in the Item, pursuant to the 2012 Appropriation Act.	1, 2, 3, 4, 7, 8, 9
Cardinal Standards	VITA will coordinate with the Department of Transportation (DOT) and the Department of Accounts (DOA) to identify standards being implemented by Cardinal, which may be adopted as Commonwealth standards.	2
EIA Governance Framework	On July 3, 2012, the Secretary of Technology adopted new language relating to EIA into the adopted Enterprise Architecture Policy 200-02. VITA continues to work under the adopted policy to establish a new Enterprise Information Architecture (EIA) governance framework.	3, 9
VITA Project Review	VITA Data Governance, IT Investment Management (ITIM) and PMD will evaluate projects cited in the Item to determine whether the systems are in-scope for Commonwealth data standardization. In-scope systems will undergo a full review by Commonwealth Data Governance (CDG) staff to identify which include standardized data. In-scope systems implementing standardized data will be evaluated to determine which standards may be adopted as Commonwealth standards.	5, 6
VITA Statutory Role	VITA Legal and Legislative Services staff will coordinate with VITA CDG to identify any changes to the statutes to clarify VITA's role and legal authority relating to data standardization.	4, 7
VITA Resource Request	VITA Budget staff will coordinate with VITA Data Governance to identify any resource requests necessary to support data standardization.	8

Item 427 C.1 Element

"...the Secretary of Technology shall work with all Cabinet Secretaries and their agencies to develop Commonwealth data standards for citizen-centric data, personnel, recipient information, and other common sources of information gathered by the Commonwealth and in use by systems set out within this item.... In developing the plan, the Secretary of Technology shall use best practices, federal requirements, and existing data standards."

Item 427 C.1
2012 Appropriation Act

In compliance with Item 427 C.1, and on behalf of the Secretary of Technology, VITA will work with Cabinet Secretaries and their agencies to develop a strategy for standardizing the types of data outlined in the Item: *"...citizen-centric data, personnel, recipient information, and other common sources of information gathered by the Commonwealth and in use by systems set out within this item."* Projects cited in the Item will be reviewed by VITA's Commonwealth Data Governance (CDG), IT Investment Management (ITIM) and Project Management Division (PMD) staff to assess whether the data managed in the system would be in-scope for the standardization requirements. CDG staff will be responsible for making the final scope determination.

A core element of the implementation strategy will be to migrate systems determined to be in-scope to the Item, and not already designed based on an adopted standards, into conformance with the NIEM. NIEM provides a common discipline, a stable and established set of standards, and a thriving support community that helps to maximize the exchange of citizen-centric data across levels of government and lines of business. An introduction to NIEM has been provided in **Appendix 3**.

NIEM started in 2005 as an outgrowth of the U.S. Department of Justice's Global Justice XML Data Model project and has become a collaborative partnership across levels of government and private industry. NIEM has been endorsed by NASCIO as the set of standards and governance structure for agencies at all levels of government to adopt for exchanging citizen-centric data:

*"NIEM should be integrated into state government enterprise architecture and data management strategy specifically for planning and implementing inter-governmental information exchanges. NIEM provides a broad range of products and capabilities for planning and implementing enterprise-wide information exchanges...What is needed is a common discipline for information sharing that is employed by all government lines of business. NIEM exists as that discipline for federal, state and local government."*²

² NASCIO. 2011. "NASCIO Recommends State Government Adopt the National Information Exchange Model (NIEM) to Enable Government Information Sharing." Press Release Issued April 28, 2011. Lexington, KY: NASCIO.

Migration to NIEM standards will align the Commonwealth with industry best practices, federal standards and existing data standards, as required by Item 427 C.1. Federal agencies increasingly require NIEM-conformant solutions and information exchanges as part of their funding programs and to facilitate performance reporting. In addition, NIEM will allow Commonwealth agencies to meet the data-standardization requirements without having to modify the underlying data architecture of existing systems or COTS solutions.

Adoption of NIEM as the Commonwealth's standard for citizen-centric data builds upon four main assumptions:

1. All agencies manage citizen-centric data, as defined by Item 427 C.1. The ability to perform data management tasks based on adopted standards will therefore enable agencies to increase efficiency and effectiveness.
2. Without standards, agencies build data architectures and data management strategies one system at a time, potentially incurring the full cost of data element discovery, requirements analysis and system development each time. Additionally, each agency may elect to use their own "internal" standard and or data format, leading to a proliferation of data "silos."
3. Adopting a standard such as NIEM requires agencies to make up-front investment of time and resources to educate implementers on NIEM's standards and approaches.
4. Standardized, NIEM-conformant data systems will reduce costs over time because agencies will benefit from the structured, repeatable methodology for sharing information and the efficiencies derived from the NIEM governance model to manage changes to the standard over time.

The following sections of this report document a recommended implementation strategy for implementing the NIEM-conformant standards and a proposed methodology for determining the scope, cost and scheduling of the NIEM implementation, as required by the Item. The implementation strategy and methodology statements reflect insights generated by VITA during the first phases of mapping adopted Commonwealth standards for citizen-centric data to the NIEM standards.

A. IMPLEMENTATION STRATEGY

Pursuant to Item 427 C.1, VITA has started developing an implementation strategy to migrate Commonwealth agencies to NIEM standards for the data and systems deemed in-scope pursuant to the Item. As part of the implementation strategy, VITA will coordinate with agencies during implementation to leverage and reuse the adopted NIEM Information Exchange Packages (IEPs) and supporting IEP Documentation (IEPD) for the in-scope data elements.

In support of this strategy, VITA has begun a preliminary "mapping" of adopted Commonwealth standards for person and employee data to a NIEM-conformant IEP/IEPD. Mapping involves aligning data elements, definitions and specifications within a system, solution or standard to NIEM-conformant set of data elements,

definitions and specifications. Information gathered during this mapping process will be used to refine the implementation strategy, cost-estimation modeling and scheduling requirements pursuant to the Item. Sample tables from the NIEM IEP/IEPD maps completed, to date, by VITA CDG staff have been provided in **Appendix 4**.

The implementation strategy will address information systems at three primary stages of the system lifecycle: new (future) systems, systems currently in development, and existing systems.

- **New Systems:** Agencies proposing new in-scope systems will be required to comply fully with NIEM standards. During the Project Initiation and prior to Project Approval, agencies will be required to demonstrate in the project documentation their strategy for implementing a NIEM IEP/IEPD for the system.
- **Systems Currently in Development:** Agencies currently developing in-scope systems will be evaluated to determine the cost and technical feasibility of NIEM conformance. The evaluation will assess the fiscal impact and technical requirements for implementing a NIEM IEP/IEPD for the system.
- **Legacy Systems:** Agencies maintaining in-scope legacy systems will be evaluated to determine the cost and technical feasibility of NIEM conformance. The evaluation will assess the fiscal impact and technical requirements for implementing a NIEM IEP/IEPD.

B. SCOPE

Pursuant to Item 427 C.1, the scope for the NIEM implementation strategy will include all citizen-centric data, personnel, recipient information, and other common sources of information gathered by the Commonwealth and in use by systems set out within the Item.

C. COST ESTIMATION MODEL

To estimate the cost associated with a Commonwealth-wide implementation of NIEM standards, VITA proposes using the methodology established in the NIEM cost model, developed by the NIEM Program Management Office. The NIEM Cost Model will give VITA the tools needed to analyze the fiscal impact of developing NIEM exchanges – from the initial development of the IEPD standards to the actual implementation of the exchange. In addition, the NIEM Cost Model will allow VITA to align model assumptions and input variables with conditions in agency or source systems. This makes the model a contextually appropriate, scalable and reliable instrument for NIEM cost estimation. The NIEM Cost Model has been used at all levels of government to compare the resource impacts of NIEM-conformant standards, customized data exchange standards and traditional data standards. An overview of the NIEM cost model has been provided in **Appendix 5**.

VITA will apply the model to each phase of the NIEM development lifecycle to estimate costs for developing, documenting, and implementing a NIEM-conformant exchange. VITA will use input data compiled during the preliminary mapping of adopted Commonwealth standards to NIEM standards, cited above, to test and

refine the cost estimation model. As it implements the cost model, VITA will follow NIEM guidance and other support documentation. This will ensure consistency with NIEM-recommended practices for cost estimation, budgeting and fiscal monitoring.

VITA will apply the NIEM Cost Model to estimate the fiscal impact of NIEM implementation for the Commonwealth. VITA's use of the model will generate a per-system estimate of the cost to bring each in-scope system into conformance with the NIEM standards. VITA will present the results from the cost-estimation modeling on July 1, 2013, as part of the final plan submittal pursuant to the Item.

D. SCHEDULE

VITA will prepare a project plan and schedule to document the processes, milestones and timeline for migrating the Commonwealth to NIEM standards for citizen-centric data. The project plan and schedule will be developed based on NIEM guidance, as articulated in the NIEM project planning template published by the Integrated Justice Information Systems (IJIS) Institute. The IJIS Institute is a consortium of industry's leading information technology companies working collaboratively with federal, state, local and tribal agencies to provide technical assistance, training, and support services for NIEM.

In June 2012, VITA staff participated in a three-day technical training workshop on NIEM provided by the IJIS Institute. During the training, VITA staff was introduced to the NIEM project planning methodology. In October 2012, VITA also will host an onsite NIEM training for Commonwealth agencies. VITA staff will build upon this training experience, and the experience of other Commonwealth agencies that have implemented NIEM standards when refining the project planning methodology. The project plan and schedule will cover the entire NIEM IEPD lifecycle to ensure full documentation of key processes, milestones and timelines. An overview of the NIEM project planning and schedule methodology has been provided in **Appendix 6**.

Concurrent with the application of the NIEM cost model, VITA will align the NIEM project planning model with the Commonwealth's ITIM/PMD project review process to produce a schedule for NIEM implementation. VITA's use of the NIEM model will generate the required processes, milestones and time to completion for bringing each in-scope system into conformance with the NIEM standards. VITA plans to present the results from the NIEM Project Plan and Schedule on July 1, 2013, as part of the final plan submittal pursuant to Item 427 C.1.

Item 427 C.2 Element

"Where active projects in this item, have implemented standardized data, the Secretary of Technology shall work with all Cabinet Secretaries and their agencies to determine if these standards should be adopted as Commonwealth data standards ... Where active projects in this item do not conform to the Commonwealth's data standard, the Secretary of Technology shall include in the interim a plan for how the Secretary of Technology will identify data standards that should be adopted as Commonwealth data standards..."

Item 427 C.2
2012 Appropriation Act

In compliance with Item 427 C.2, and on behalf of the Secretary of Technology, VITA will work with Cabinet Secretaries and their agencies to develop a strategy for (1) determining which standards implemented by projects cited in the Item should be adopted as Commonwealth standards and (2) ensuring that the projects cited in the Item comply with adopted data standards or data exchange standards, as appropriate. This strategy will involve coordination between VITA CDG, ITIM and PMD staff. Projects cited in the Item will be reviewed by ITIM and PMD staff to assess whether the data managed in the system may be in-scope for Commonwealth data standardization or implementation of standardized data. In-scope systems then will undergo a full review by CDG staff to identify which are implementing standardized data. In-scope systems implementing standardized data will be evaluated by CDG staff to determine which standards may be adopted as Commonwealth standards.

Following the determination of whether the project is in-scope and appropriate for standards determination, CDG staff will implement the EIA process model for developing Commonwealth standards and recommending standards for adoption by the Secretary of Technology. The EIA process model features the following primary steps:

- Research support: Provide research support to identify and harmonize proposed standards with existing standards or services
- Stakeholder engagement: Facilitate a stakeholder workshop to gather input from Commonwealth agency data stewards
- HITSAC review/public comment: Compile the business narrative, data dictionary and other support documentation for HITSAC review, if required, and public comment on VITA's Online Review and Comment Application (ORCA).
- Decision package and adoption: Revise the data standard documentation based on HITSAC or public comments and prepare decision package for the CIO of the Commonwealth and Secretary of Technology.
- EA Data Standards Repository: Upon adoption by the Secretary of Technology, publish the standard in the EA Data Standards Repository. Conduct quarterly reviews of adopted standards to ensure currency.

The following sections of this report outline the implementation strategy, cost estimation and timeline for implementing standards adopted as Commonwealth standards from the projects cited in the Item.

A. IMPLEMENTATION STRATEGY

Pursuant to Item 427 C.2, VITA has started developing an implementation strategy for Commonwealth standards adopted from projects cited in the Item. Comparable to the implementation strategy cited above for Item 427 C.1, the implementation strategy under this element will address information systems at three primary stages of the system lifecycle: new (future) systems, systems currently in development, and existing or “legacy” systems. The methodology for determining whether a system would be considered in-scope has been outlined below.

- New systems: Agencies proposing new in-scope systems will be required to implement adopted Commonwealth standards or alternate strategy for implementing standardized data. As part of project review, agencies will have to demonstrate in the project documentation their strategy for implementing data standards, data exchange standards or alternate strategy for the system.
- Systems currently in development: Agencies currently developing in-scope systems will be required to amend their project charter and include adopted standards as part of the project scope. The amended charter and scope will need to demonstrate how the system will implement a compliant data standards, data exchange standards or alternate strategy.
- Legacy systems: Agencies maintaining in-scope legacy systems will be required to develop and implement mechanisms to implement adopted standards. As a first step in the process, agencies will need to prepare a migration plan to document the scope and schedule for implementing the compliant standards.

B. SCOPE

To evaluate whether a project would be considered in-scope, VITA will amend its project review process to incorporate measures to be used by ITIM, PMD and CDG staff for scope determination. VITA anticipates implementing the scope reviews at multiple phases of the project lifecycle: investment business case approval, project initiation, project planning and project approval. The first step in the scope review will be completed by ITIM/PMD staff and consist of a brief survey to determine whether the more in-depth CDG review would be required. Next, CDG staff will implement a full scoping survey to complete the evaluation and make the final scope determination. A draft of the CDG survey instrument has been provided in **Appendix 7**.

Projects determined by CDG staff to be in-scope for the Item 427 C.2 requirements and adopted standards will be monitored throughout the project lifecycle. CDG staff will evaluate those projects implementing standardized data to determine whether the project’s data standards /data exchange standards/services should be adopted as Commonwealth standards. CDG staff also will work with the project leads to identify existing standards and harmonize the project’s data standards/data exchange standards/services with applicable standards. If the project’s data standards/data exchange standards/services would be appropriate for adoption as a Commonwealth standard, CDG will work with the owners of the standard/service to complete the EIA data standardization process model outlined above in this report.

C. COST ESTIMATION MODEL

To estimate the cost of complying with the Item 427 C.2 requirements, VITA proposes implementing a modified version of the NIEM cost model and supporting methodology outlined above in the Item 427 C.1 Element of this report. The NIEM cost model will give VITA the tools needed to analyze the fiscal impact of identifying in-scope projects, determining which projects are implementing standardized data, assessing which of the project standards/services may be adopted as Commonwealth standards, and estimating the cost of compliance with standards adopted from projects cited in the Item. VITA will modify the input variables and values, as needed, to align the NIEM cost model with other agency solutions and data elements to be standardized.

VITA will apply the modified NIEM cost model to estimate the fiscal impact of the Item 427 C.2 implementation strategy. VITA's use of the model will generate a per-system estimate of the cost to implement the Item 427 C.2 requirements. VITA plans to present the results from the cost estimation modeling on July 1, 2013, as part of the final plan submittal pursuant to the Item.

D. SCHEDULE

VITA will prepare a project plan and schedule to document the processes, milestones and timeline for implementing the Item 427 C.2 requirements. The project plan and schedule will be developed consistent with the NIEM project plan outlined under the Item 427 C.2 element of this report.

VITA will align the NIEM project planning model with the ITIM/PMD project management lifecycle to produce a schedule for implementing the Item 427 C.2 requirements. VITA's use of the NIEM model along with the ITIM/PMD project management model will generate the required processes, milestones and time to completion for bringing each in-scope system into compliance with the Item 427 C.2 requirements. VITA plans to present the results from the project planning and schedule on July 1, 2013, as part of the final plan submittal pursuant to the Item.