Health Information Strategic Plan

for

Veterans Health Administration
Supporting VA Health Care

Fiscal Year 2014 – 2019

Version 2.4

July 2014

Whenever this document is revised, the applicable version, date, change/approval authorities, and a brief summary of (and reason for) the changes should be recorded in the table immediately below.

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0.5	Feb. 2009	VHA OHI Health Systems BA	Integrated feedback from Health Systems HPS portfolio and Gregg Buckley, Director, VHA Office of Strategic Planning; clarified reasons for current lack of goals and objectives; updated Figure 3; also, validated statistics, identified preliminary implications from the ARRA/HITECH Provisions from the Stimulus Bill, and clarified CARES verbiage	Feedback from Health Systems and VHA OPP Reviews	- - -
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1.3	March 2012	VHA OHI BA HISP Team	Quarterly updates, drivers and governance refresh	Recent VHA Developments, HIMSS 2012 insights	
1.4	June 2012	VHA OHI BA HISP Team	Quarterly updates, drivers refresh, and introduce HISP Milestone Actions	Additional insights from operating plans, recent OMB guidance, and VA's prioritization process	
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2.2	December 2013	VHA SIM BA HISP Team	Quarterly updates, additional updates based on PPBE guidance.	Response to PPBE implementation, progress in performance architecture area	
2.3	March 2014	VHA SIM BA HISP	Quarterly updates, goals update.	Response to evolution of health	

		Team		care drivers and strategies.	
2.4	July 2014	VHA SIM BA HISP Team	Quarterly updates.	Response to evolving HISP drivers.	

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1 INTRODUCTION

This section serves as a general introduction to both the document and its subject matter.

1.1 PURPOSE AND SCOPE

The Veterans Health Administration (VHA) Health Information Strategic Plan (HISP) represents the strategic direction for health information technology (HIT) within VHA. This document describes the IT strategic direction being followed by VHA's Office of Informatics and Analytics (OIA) as it develops requirements for and performs acquisition of IT services, which enable the strategic and tactical objectives of VHA's clinical and business leaders[1]. VHA OIA is working with these leaders to define the boundaries and characteristics of the various IT programs that are required to achieve these objectives.

Although written as a separate document, the VHA HISP is best understood when taken in context with the VHA and Department of Veterans Affairs (VA) overall strategic and management plans. Within VHA, there is an administration level strategic planning effort, as well as numerous complementary documents being developed by the Veterans Integrated Service Networks (VISN) and other program offices within VHA, some of which may include IT components. The VHA HISP is formulated to inform the VHA Strategic Plan[2], the VA Enterprise Roadmap, the VA IRM Strategic Plan, and support the Planning, Programming, Budgeting & Execution (PPBE) process currently in development.

The intended time span coverage of the VHA HISP is FY 2014 through 2018.

1.2 APPROACH AND DOCUMENT LAYOUT

Regular scans of the health information environment are performed. The environmental scans look for:

- Currently unmet needs and gaps between what the VA Healthcare System is required to be accomplishing and what it is capable of accomplishing
- Potential changes in the environment relative to:
    - Veteran Demographics and Needs
    - Healthcare Industry Business Impact
    - VA / Government Legislation and Guidance
    - Healthcare Information Technology Impacts

Section 2 focuses on the unmet needs and gaps in the present environment. Section 3 focuses on the forecasting of changes yet to come -- those changes likely to occur are documented and analyzed into strategic goals. Section 4 introduces the VHA Strategic Framework and identifies alignment to performance measures, prioritization criteria, and the VHA Business Function Framework. Summaries of additional drivers impacting health information can be found in section 5.

This approach is graphically summarized in Figure 1.

[1] The Health Information Strategic Plan (i.e., this document) is a work product of OIA, and is designed to focus specifically to the strategic direction of IT within VHA as a whole, as opposed to the strategic direction of a particular organization within the administration.

[2] The VHA OIA Strategic Plan is a separate document from this one, and is focused on the strategic direction of the Office of Informatics and Analytics and its organizations.

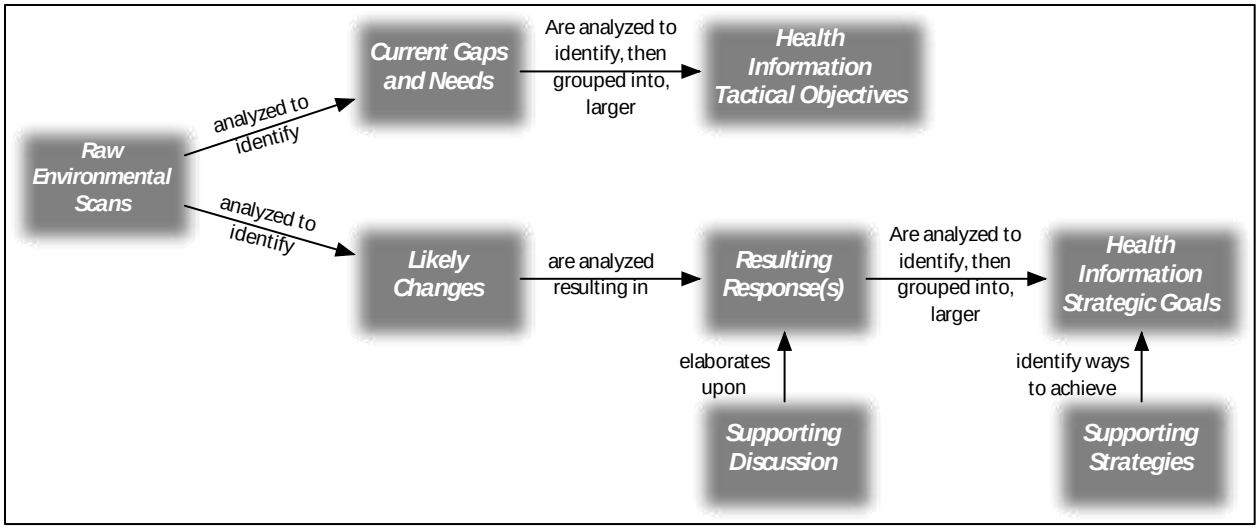

Figure 1 - How the Key Parts of this Section Relate

1.3 INTENDED AUDIENCE

The intended audience for the VHA HISP includes: VHA Resources Committee IT Subcommittee Stakeholders[3], BA leadership, Health Informatics portfolio leads and analysts, VHA OIA leadership, VHA Office of Policy and Planning, VHA Office of Strategic Integration, VA Office of Information and Technology (OI&T) IT strategic planners (Architecture Strategy and Design [ASD]), VA Office of Product Development (OPD) management, VA Office of Policy and Planning (OPP), and VA/Department of Defense (DoD) integrated Electronic Health Record (iEHR) working groups. Figure 2 below presents a graphical overview of the relationships of the planning documents.

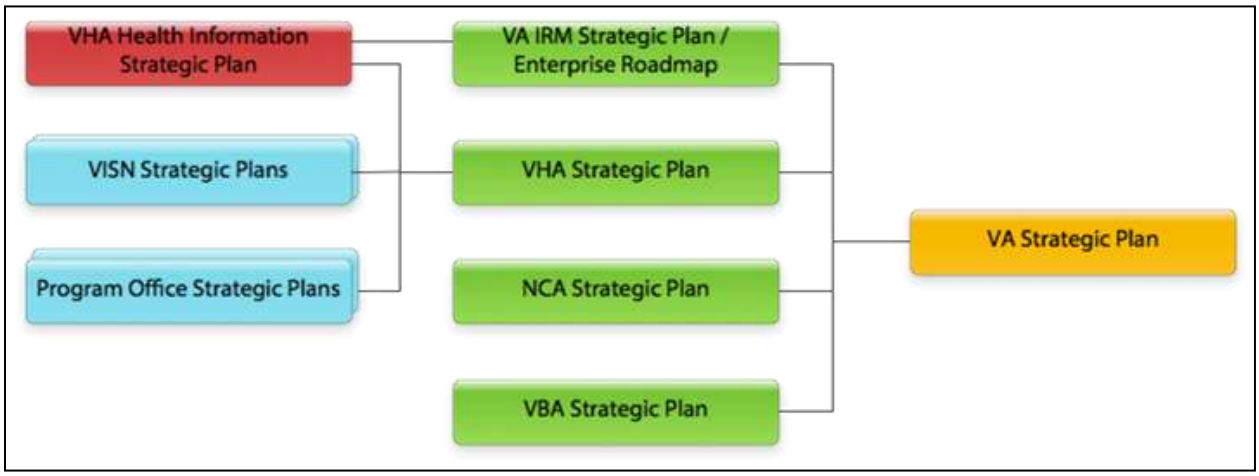

Figure 2 - Strategic Planning Document Relationships

As new operating plans are developed, the HISP is intended to inform those operating plans. The HISP is not intended to be an Office of Management and Budget (OMB)-mandated document; however, it sets the vision and direction of Health Information Technology (HIT). Previously, the HISP was used to inform VA's Strategic Plan Refresh process as part of Environmental Scan Execution Team (ESET) activities with

[3] The IT Subcommittee was established under the Resources Committee as part of VHA's National Leadership Council (NLC).

emphasis on Rapidly Advancing Technology across multiple disciplines theme. The applicability of HISP (i.e., its value proposition) is illustrated in Figure 3.

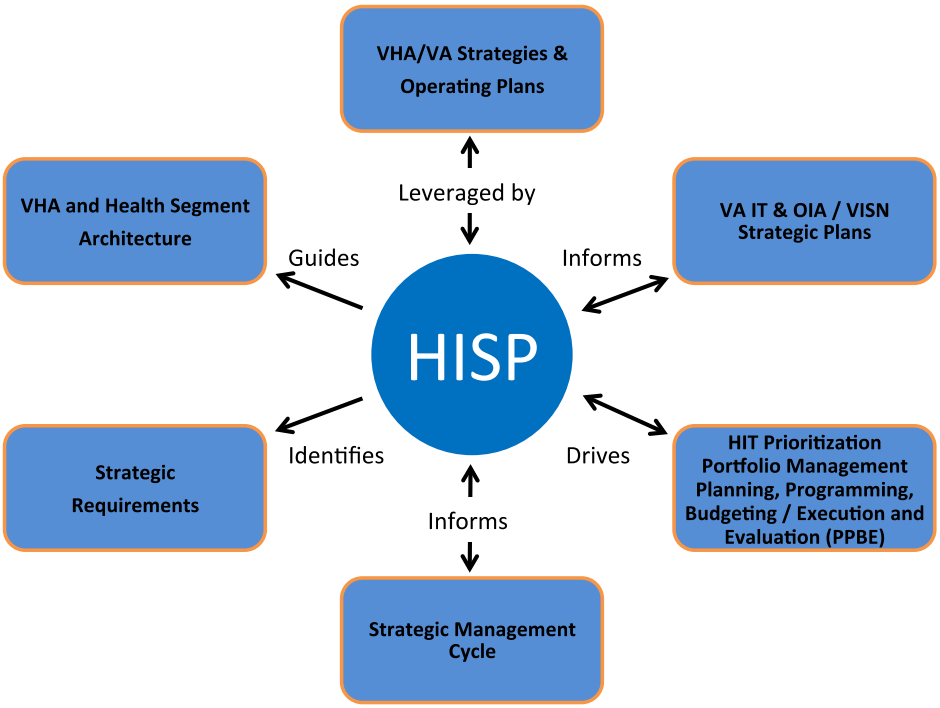

Figure 3 - HISP Scope

2 CURRENT SITUATION OF HEALTH INFORMATION

This section introduces the VA health care as-is environment. This section introduces the VA and VHA mission and vision, strategic goals and objectives, current iterations of the strategy and performance architectures, regulatory drivers and mandates, as well as an overview of the current health information technology environment.

2.1 SUMMARY OF THE CURRENT HEALTH INFORMATION BUSINESS ENVIRONMENT

VA continues to maintain its status as the largest integrated health care system in America. The VA health care system has grown from 54 hospitals in 1930 to 152 hospitals today and more than 980 community-based outpatient clinics (CBOCs). VA health care facilities provide a broad spectrum of medical, surgical and rehabilitative care. VA has implemented new innovative practices to improve Veterans' access to healthcare, such as telemedicine and mobile clinics to provide care to more than 5.6 million unique patients. The Department's commitment to delivering timely, high-quality health care to America's Veterans, while controlling costs, remains a top priority.

VA has embraced opportunities to increase access to service via advances in information technology. The use of home telehealth technologies, including videoconferencing, the Internet, store-and-forward imaging, streaming media, and wireless communications enables patients with chronic diseases such as diabetes, heart failure, and chronic pulmonary disease to be monitored at home. These advances reduce hospital admissions, clinic visits, and emergency room visits. Elderly or disabled patients are able to stay in their homes longer and it is possible to provide cutting-edge specialty care even in sparsely populated areas. These programs are especially beneficial for the two to three percent of patients who, in part because they frequently visit hospitals and outpatient clinics, account for approximately 30 percent of health care costs.

Beginning in FY 2014, all funded IT projects that formerly fell under the VHA Major Initiatives IT projects are now part of the VHA Integrated Health Portfolio (IHP). These projects fell under seven areas: New Models of Care (NMHC), Enhancing Veterans Experience Access to Healthcare (EVEAH), Health Informatics (hI2), Improving Veterans Mental Health (IVMH), Healthcare Efficiency (HCE), Office of Research and Development (ORD), and Service Oriented Architecture Research and Development (SOARD).

- **New Models of Health Care (NMHC):** NMHC has been designed to transform the delivery of healthcare within the VA and to position the Department as a leader in the healthcare industry through innovations for both Veterans and providers. NMHC is composed of nine sub-initiatives: Patient Aligned Care Team, Prevention, Virtual Medicine Non-Telehealth, Telehealth, Non-Institutional Long Term Care, Specialty Care, Women's Health, Mobile Applications, and Patient Centered Care. NMHC will explore novel uses of Telehealth technology to bring specialized services to more remote locations, thus improving access and reducing patient travel. NMHC will improve access by supporting more convenient ways of providing care. NMHC will also contribute to VA having a world class, right-sized infrastructure by developing a systematic, value-driven approach to ensure the provision of optimal care for all enrolled Veterans. Coordinated care will improve patient outcomes and satisfaction with the services VHA offers.
- **Enhancing Veterans Experience and Access to Health Care (EVEAH):** EVEAH contributes to expanding Veterans' options and availability of healthcare services. Through the implementation of EVEAH, Veterans will be able to easily navigate the VA system to receive desired services. Through new technology, care alternatives will be created in order to meet special population

access needs. Under EVEAH, Increment 3 and 4 of the Bed Management Solution version 1.0 will deploy nationally. This deployment will provide VA hospitals the ability to manage bed availability, resulting in reduced wait times for admissions from the emergency departments.

- **Health Informatics (hi2):** As part of VistA Evolution, Health Informatics will deliver software solutions and establish health informatics literacy for the adoption of the Health Management Platform (HMP). It will also provide tools to support Veteran and Active Duty-aligned care teams and add more data domains to Virtual Patient Record for sharing with partner systems.
- **Improve Veteran Mental Health (IVMH):** The IVMH initiative seeks to develop and maintain a self-regulating, patient-centered mental healthcare system within the larger VA healthcare structure. The initiative focuses on building both an IT and a programmatic infrastructure to support implementation of evidence-based treatments laid out in the VHA Handbook on Uniform Metal Health Services. This improved mental health infrastructure will monitor clinical programs, provide feedback to address problems, ensure clinical services are patient centered, and address mental health needs that emerge in all medical care settings. The new infrastructure will include software to plan treatments and track high risk patients, as well as a pilot to increase use of evidence-based psychopharmacology.
- **Health Care Efficiency (HCE):** Improve the quality of health care while reducing cost. The purpose of this initiative is to coordinate and accelerate the ongoing cost savings initiatives with new initiatives to allow VA to enhance services to clients. Reduce operational costs and streamline program deployment to enhance program efficiency. Achieve cost savings through consolidated purchasing. Reduce non-VA care coordination clinical and business practice variability. Reduce cost per patient transported in the Beneficiary Travel Program.
- **Office of Research and Development (ORD):** Because clinical care and research occur together under one roof, VA brings scientific discovery from the patient's bedside to the laboratory and back, making this program one of VA's most effective tools for improving the care of Veterans. VA will play a leading role in the advancement of clinical medical knowledge, particularly in those health issues associated with military service, by excelling in research and development of evidence-based clinical care and delivery system improvements to enhance the long-term health and well-being of Veterans.
- **Service Oriented Architecture Research and Development (SOARD):** SOARD is a new project that will be included in IHP. SOARD is a multi-year effort to replace VA's existing asset management system with a single web-based, integrated, enterprise-level system. It leverages a federated, partnership-based enterprise management model to help ensure the needs of Veterans are met. SOARD addresses VA's critical need for a modernized and integrated asset management capability.

Leading Access and Scheduling Initiative: In June 2014, the Acting Undersecretary for Health launched the Leading Access and Scheduling Initiative, to make rapid and definitive changes to ensure integrity in managing Veterans' access to care so the agency can maintain its focus on providing Veterans timely access to quality health care. LASI will involve individuals from across the VHA. This initiative will be led by the Office of the Deputy Under Secretary for Health for Operations and Management (DUSHOM). The Office of Strategic Integration (OSI) will coordinate the LASI activities, and provide necessary information / tools for program execution and monitoring.

Integrated Electronic Health Record (iEHR) / Vista Evolution: In 2009, President Barack Obama charged the Departments of Defense and Veterans Affairs with establishing a concurrent method by which active and retired service members can access their health records. Specifically, the Departments were called upon to, "work together to define and build a seamless system of integration so that when a member of the Armed Forces separates from the military, he or she will no longer have to walk paperwork from a DoD duty station to a local VA health center. Their electronic records will transition along with them and remain with them forever."

This electronic healthcare record (EHR), by design, will increase efficiency and improve care delivered to Service members, Veterans and their beneficiaries. The current system of delivering an EHR for VA, Veterans Health Information Systems and Technology Architecture (VistA), is undergoing substantial enhancements and modifications in order to achieve this charter. The VistA Evolution Program (VEP) is responsible for the management of this ambitious project.

The Interagency Program Office (IPO) is tasked to foster interoperability between the VA and DoD's electronic health records. The Vista Evolution Program will work with the DoD Healthcare Management System Modernization (DHMSM) Program to establish common interfaces to improve the delivery of an integrated electronic healthcare experience. The end product of the VistA Evolution Program, VistA 4, will be a state of the art electronic health technology, certified and capable of supporting Meaningful Use (MU) that improves quality, safety, efficiency, and reduces health disparities; engages patients, improves care coordination, improves population health and maintains the security and privacy of Personal Health Information (PHI).

The VA is committed to evolving VistA to include an open, modular architecture supporting integration of best-of-breed applications, consistent with the proposed iEHR technical architectural principles. The VistA/iEHR core development is currently in process. Initial activities include identifying and analyzing the specifications for VistA, identifying any gaps between the iEHR core definition and current VistA functionality and architecture, and identifying the strategy to produce a VistA-based application suite that meets all of the iEHR core requirements. The VA is committed to meeting the initial operational capability (IOC) timeline with this VistA Evolution work.

The VistA Evolution Program will deliver a next generation VistA product entitled VistA-4, reflecting the legacy of VistA advancement shaped from three prior major iterations. VistA-4 will provide the tools necessary for VA to maintain its track record as a highly acclaimed healthcare technology. VistA-4 will support delivery of services that are both Veteran-centered and evidence-based, which are consistent with VA and federal healthcare goals. VistA-4 will support care coordination—a model of healthcare delivery and quality improvement in which teams of clinicians include the Veteran in collaboratively addressing the Veterans' healthcare needs according to clear Veteran-driven goals. Care coordination also promotes quality improvement in healthcare processes for all Veterans.

VistA-4 will rely upon infrastructure components, process, data models, and services that support an open, modular, extensible EHR platform with the goal of providing high-quality solutions. The resulting system will be flexible and agile, accommodating new technology advances and designed to efficiently achieve optimal results, as benchmarked by detailed performance measures. Upon implementation of VistA-4, the VA will be well positioned to interoperate with the DoD and other healthcare partners using modern, flexible technologies and standards. This enhances VA efforts to improve the health status of Veterans through the delivery of a longitudinal integrated health record that supports the continuum of care.

- The VistA-4 product objectives for completion at the end of FY17 include:

- A user experience that integrates information for improved quality of clinician and Veteran reasoning;
- Sharable decision support to promote best clinical practices tailored to the Veteran's clinical condition and health-related goals;
- Capabilities for clinicians, managers, and researchers to define and manage Veteran populations;
- Management of activities that improve human and material resource utilization and clarify plans of care for all members of the team including the Veteran;
- Explicit incorporation of Veteran goals in the care plan, to support Veteran-defined terms of success;
- Continued adoption and development of the personal health record to foster patient engagement and empowerment;
- A technological platform that supports modern standards of open, extensible, and interoperable systems; and,
- Enterprise-wide deployment. [4]

VA Planning, Programming, Budgeting and Execution (PPBE): VA has initiated implementation of the PPBE process across the Department. PPBE is a multiyear process to plan and execute for mission accomplishment.

A fully integrated PPBE process is a key component in transforming the Department into a 21st century organization that is Veteran-centric, results-driven, and forward looking. PPBE is the Department's requirements-based, integrated, multi-year resource allocation process. It provides a structured and data driven approach for the VA to assess its needs, allocate resources, and formulate a budget that delivers quality and timely benefits and services to Veterans. (Footnote as VA Programming Guidance: FY 2016-2020)

Given the long term nature of the PPBE approach, the goals in this Health Information Strategic Plan will help drive the implementation of VHA's long term planning process.

Domains of Value: As part of its consideration for adoption of the Balanced Scorecard concept for business performance management, VHA has identified elements called Domains of Value (DOV). These were developed to focus on adding value to VHA's investments and provide leading indicators and drivers for the future state – primary, secondary and tertiary. The DOV's have been mapped to the Balanced Scorecard categories to show their focus area and value sequence. The DOV's can be used to help prioritize investments for executive decision-making. The DOV's are illustrated[5] in x below:

[4] VistA Evolution Program Plan, Initial Operation Capability, Version 1.6, December 13, 2013.

[5] Proposed Revisions to the EDM Prioritization Criteria, National Leadership Council, November 13, 2013

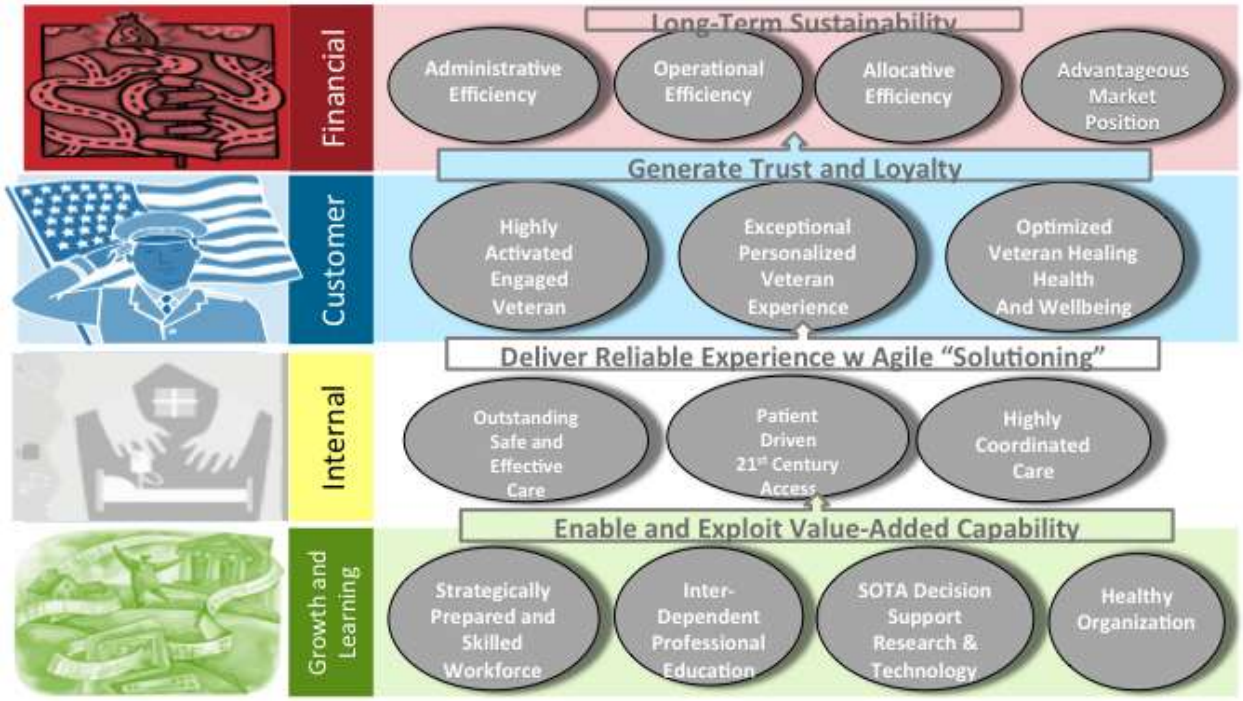

Figure 4 - Domains of Value

VHA Programs:

The Department has developed a list of VHA programs from VA's overall list Federal Programs, for use in budgeting, funding and prioritization analysis. Information pertaining to the programs can be found in VA's Federal Program Inventory and VA's portion of the President's budget. VA designed its approach for the Federal Program Inventory to closely mirror the budget structure, which aligns to the way the Department manages. This list of programs is intended to resonate with key external stakeholders, including but not limited to: Congress and Veterans Service Organizations (VSO).

Generally, programs consist of 1-2 program activity (PA) lines of the President's Budget Appendix. Some programs, however, are the aggregation of multiple program activity lines. The Department aggregated, disaggregated or maintained the PA lines to develop a program inventory that resonates with VA's external partners and reflects internal agency operations.

The current VHA program inventory is as follows:

- Inpatient Care
- Ambulatory Care
- Dental Care
- Inpatient and Ambulatory Mental Health Services
- Readjustment Counseling
- Other Rehabilitation Services
- Prosthetics

- Institutional Long term Care
- Non-Institutional Long Term Care
- Homeless Veterans Programs
- Civilian Health and Medical Program of the Department of Veterans Affairs (CHAMPVA)
- Non Modeled Health Programs
- VHA Research and Development
- VHA Input - Energy / Green Management
- VHA Input - Non-Recurring Maintenance

The Department has also identified five health care-focused Strategic Programming Items (SPI's) that include high risk, high impact, and /or cross-cutting issues with resource implications for VHA. These SPI's are listed below:

- Whole Health Approach - A well-developed national infrastructure for provision of a proactive integrative health approach to Veterans, which is inclusive of the relationship based approach of VHA Voices, self care strategies, complementary and alternative approaches, and integrative health coaching.
- Connected Health Technologies - Through this program, VA will: (1) Improve Veteran access to healthcare, (2) Support patients and their families in the self-management of their health, and (3) Satisfy desire of healthcare employees to meet the expectations of VA patients in regards to their healthcare.
- Patient Aligned Care Teams (PACT) - PACT will assist VHA in meeting goals of patient-driven, proactive, personalized care resulting in improvements in Veteran satisfaction, improved healthcare outcomes and costs.
- Mental Health - Improve mental health services to our Nation's Veterans by increasing access to the most needed services.
- Medical Specialty Care / Surgical Enhancements - Increase VHA's capacity to provide services to Veterans across the Nation to improve access to our services.

VA is a long time leader in health care information technology, but needs to do more to manage Veteran data across programs inside and outside VA. Shifts in how information is accessed and used by providers, processors, and clients present VA with the opportunity to find new ways to improve the experience of Veterans and their families, as well as enhance the value of services and support provided to them. These innovations will have significant implications for how care is organized and delivered in the future as well as for the skill sets required to provide the care.

2.2 SUMMARY OF THE CURRENT TECHNOLOGY SOLUTION ENVIRONMENT

The HISP Work Group (WG), chartered by the VHA IT Subcommittee, provides governance and input for HISP content, including the current technology solution environment. The HISP WG members perform the following in their governance and input role:

- Validate HISP content, guidance and direction (e.g., Vision, Drivers, Principles, Goals and Objectives, Milestone Actions)

- Prioritize HISP drivers
- Facilitate communication, advocacy and messaging
- Monitor progress of HISP Goals and Objectives
- Recommend governance process improvements
- Enhance the sphere of influence for HISP

Recent HISP WG activity has included reviewing strategic drivers such as Veteran population, health care utilization forecasting, patient safety, remote access to all VHA systems for providers, and the impact of the Affordable Care Act on VHA. Additionally the WG reviewed refreshed HISP Goals for HISP v2.3 in consideration of the ONC Federal Health IT Strategic Plan.

The HISP WG meets monthly to review and validate content, and assess VHA's evolving strategic drivers. Additionally, WG members provide input to the HISP team in between the monthly meetings.

2.3 Recap of and Additional Insight into Approach Used

Regular scans of the health information environment are performed. The environmental scans look for currently unmet needs (of a broad, cross-cutting, high-level nature) and gaps between what the VA Healthcare System is required to be accomplishing and what it is currently capable of accomplishing. These unmet needs and gaps are documented in subsection 2.4.

2.4 Gaps and High-Level Opportunities in the Health Information Environment

There are innumerable sources for identifying gaps and unmet needs. This section considers the most critical ones to the VA Healthcare System, namely: VA and VHA Strategic Plans and Joint DoD-VA Strategic Plan.

2.4.1 Significant High-Level Opportunities and Gaps relative to VA and VHA Strategic Plans

Critical sources of agreed upon decisions for which the VA Healthcare System needs to react are the VA and VHA Strategic Plans and Frameworks. This subsection discusses those aspects that have key Health Information impacts that are unmet.

Table 1. Unmet VA and VHA Strategic Plan Items

Unmet Need	Resulting Needs and Discussion
In order to deliver improved services, VA must have quality IT solutions that are responsive to the needs of clients and customers	*Need to deliver improved IT solutions that enable reengineered business processes by reducing the need to enter duplicative data, providing continuous connectivity to facilitate communications with VA, and access to benefits and improving services.*
Develop a corporate analysis and evaluation capability	*Need to improve allocation decisions and to get the best value for scarce resources, develop a corporate analysis and evaluation (CAE) capability that will enable the Department to use cutting-edge planning, programming, budgeting, and evaluation techniques to inform corporate decision-making, enabling us to implement the most cost-effective approaches to achieving stated objectives. Model after similar*

TABLE 1. UNMET VA AND VHA STRATEGIC PLAN ITEMS	
UNMET NEED	**RESULTING NEEDS AND DISCUSSION**
	more mature efforts being used to implement Planning, Programming, Budgeting and Evaluation (PPBE) in other Federal agencies such as DoD.
Contribute customer-driven IT solutions	*Need for flexible, just-in-time delivery of external-client-valued services and products to the Veteran and their families enabled by more accessible, reliable, and secure information related services. Applications need to be available online and information must be shared with other appropriate federal departments. VA needs to standardize IT systems to be interoperable, secure, and high-performing across VA.*
IT investments are not prioritized and made timely to support personalized, proactive health care improvements	*Need to ensure VHA input in the VA IT budget and prioritization process to support funding in software development and IT infrastructure is aligned with VHA future growth in customer service to our Veterans, emerging technologies in health care, recruitment and retention. VHA needs to identify and undertake opportunities to create efficiency, eliminate IT duplications, and consolidate VHA emerging technologies.*
Comprehensive sequencing and transition plans not developed.	*Need comprehensive transition planning to ensure that funding, architectural decisions, contracting, design and implementation are all integrated and properly sequenced to maximize business value for VA. Additionally this will help to coordinate efforts to better utilize scarce budget and human resources.*
Integrated strategic, capital and IT plans are not developed and approved in a timely manner.	*Need to synchronize approved VHA capital projects with Office of Information and Technology investment plans to secure necessary Information Technology funding.*

2.4.2 Significant High-Level Unmet Needs and Gaps relative to the VA-DoD Joint Strategic Plan

Critical sources of agreed upon decisions for which the VA Healthcare System needs to react is the VA-DoD Joint Strategic Plan. This subsection discusses those aspects that have key Health Information impacts that are unmet.

TABLE 2. UNMET LAWS, REGULATIONS, RULES, MANDATES, AND POLICIES	
UNMET NEED	**RESULTING NEEDS AND DISCUSSION**
Promote measurable, safe, effective, timely, efficient and equitable, client-centered quality health care for all Service members, Veterans, and their beneficiaries	*Need to lead the development of evidence-based clinical practice guidelines to enhance high quality health care by increasing information sharing annually as evidenced by a) completing 100 percent of joint VA/DoD evidenced based clinical practice guidelines (EBCPGs) against the target of four guidelines, b) 100 percent of EBCPGs completed annually that are posted on the Web sites.* *Need to coordinate joint efforts to increase sharing of health surveillance information, review relevant literature on hazardous environmental exposures, and share Service member and Veteran health information between VA and DoD, so that situations in theater, which place these populations at risk, are identified, and VA and DoD responses are appropriately coordinated.*

TABLE 2. UNMET LAWS, REGULATIONS, RULES, MANDATES, AND POLICIES	
UNMET NEED	**RESULTING NEEDS AND DISCUSSION**
Facilitate improved availability and access for all Service members, Veterans, and their beneficiaries, to assure that they receive responsive care whenever they need it, in traditional and evolving delivery methods, while eliminating or reducing disparities and removing barriers to care and health care utilization.	*Need to improve access to and reduce the stigma associated with seeking mental health care services through the use of public education campaigns, self help strategies, and transitional programs as evidenced by increasing availability and utilization of psychological health-related mobile electronic applications to expand access to relevant psychological health information and services.* *Need to ensure patients receive the same type and standard of care for pain management regardless of whether they receive care in a VA or DoD facility, and that there is no interruption in treatment as a result of moving between health care systems, by developing and implementing a model system of integrated, timely, continuous, and expert pain management for Service members, Veterans, and other beneficiaries, to include metrics, by September 30, 2015.* *Need to increase the size, scope, and number of joint telehealth collaborations between the Departments by leveraging already existing initiatives (e.g., Integrated Mental Health Strategy Strategic Actions) and facilitating the establishment of new collaborations by September 30, 2014. Determine related metrics with targets by September 30, 2014.*
Encourage substantive improvement for patient-focused, high-value care, which includes assuring the delivery of the right person, at the right time, for the right price through the use of reliable health care cost and quality information.	*Need to facilitate development of initial integrated Electronic Health Record (iEHR) capability requirements through initiation of 12 Capability Integrated Product Teams by September 30, annually through FY 2015.*
Create an authoritative source of health information for the estimated 18 million DoD and VA beneficiaries, which includes the delivery of a highly flexible, reliable, secure, maintainable and sustainable system.	*Need to implement initial consolidation of DoD and VA health care systems into Defense Information Systems Agency (DISA) Defense Enterprise Computing Centers (DECCs).* *Need to deliver Single-Sign-On and Context Management (SSO/CM) capability to pre-determined DoD and VA facilities in support of integrated Electronic Health Records (iEHR) risk reduction efforts.* *Need to achieve iEHR Initial Operating Capability (IOC) in 2014: a) Provide a single iEHR Presentation Layer through a standardized and reusable framework for the Direct Care end user role; b) Deploy iEHR Infrastructure and two clinical capabilities (Lab and Immunization) to two sites - San Antonio, TX (SATX) and Hampton Roads, VA (HR); and c) Deliver pharmacy capability to North Chicago James A. Lovell Federal Health Care Center (JAL FHCC).* *Need to develop iEHR roadmap to deliver common DoD/VA capabilities prioritized by the Integrated Clinical Informatics Board.*
Ensure the highest level of economic and organization efficiency, effectiveness, and	*Need to support legacy health data sharing initiatives through the continued sharing of secured electronic health information with VA at the time of a Service member's separation and enhanced sharing of secured bidirectional electronic health information (including artifacts and images) in real-time between the*

TABLE 2. UNMET LAWS, REGULATIONS, RULES, MANDATES, AND POLICIES	
UNMET NEED	**RESULTING NEEDS AND DISCUSSION**
productivity of VA and DoD health care systems while utilizing systematic measurement that leverages information technologies and data sharing efficiencies.	*Departments for shared patients.*

3 FORECASTING THE FUTURE OF HEALTH INFORMATION

With the baseline established in the previous section of as-is, present tense environment and unmet needs, attention is now directed to forecasting. This section considers both the changes likely to occur in our environment (subsection 3.2) and the overall net goals and strategies for health information in the future as events unfold in industry and government (subsection 4).

3.1 RECAP OF AND ADDITIONAL INSIGHT INTO APPROACH USED

Regular scans of the health information environment are performed. The environmental scans look for potential changes in the environment relative to:

- Veteran Demographics and Needs
- Healthcare Industry Business Impacts
- VA / Government Legislation and Guidance
- Healthcare Information Technology Impacts

Those potential changes are assessed for likelihood of occurrence and breadth of impact. Changes likely to occur (≥ 75% likelihood of occurrence within 5 years) and having a non-localized impact are documented in subsection 3.2. Each likely change is then analyzed to determine what the VA Healthcare System would need to do in response to the change occurring. The resulting response is provided with supporting discussion alongside the likely change.

Once all the resulting responses are identified, they are analyzed as a whole looking for broader, overarching, goals. Those overarching goals and the responses required to support them are given in subsection 4.

3.2 LIKELY CHANGES IN THE HEALTH INFORMATION ENVIRONMENT

There are innumerable sources of change for the health information environment. This section identifies those from several sources or types of possible changes viewed as critical to the VA Healthcare System

3.2.1 Changes in Veteran Demographics and Needs

Demographic trends play an important role in the evolution of HIT in VHA. The anticipated changes and implications are described in Table 3.

TABLE 3. CHANGES IN VETERAN DEMOGRAPHICS AND NEEDS

LIKELY CHANGE	RESULTING RESPONSE AND DISCUSSION
Increase in use of external (non-VA) providers	*The VA Healthcare System will need to increase our capability to exchange the health record with external providers.* Currently, 32% of enrollees[6] receive care at both VA and non-VA health care facilities. With the passage of the Patient Protection and Affordable Care Act (PPACA) of 2010 (Public Law [PL] 111-148), it's likely VA's enrollees will use whatever health care facility provides them the best, most convenient, care.

[6] Self reported "dual users" as documented in the 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 46; based on 2009 data

TABLE 3. CHANGES IN VETERAN DEMOGRAPHICS AND NEEDS	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
Possible rapid fluctuation in enrollees desiring treatment	*The VA Healthcare System will need to be able to expand and contract rapidly in response to shifting demands.* • Increasing health care costs will drive more enrollees to use VA services.[7] • About 23% of our enrollees have no health insurance, a slight upward trend over the past few years.[8] • The unemployment rate of enrollees in the labor force is 22%; about twice the U.S. Civilian population rate of 9.4%. This means 8.8% of all enrollees, including those retired or otherwise not considered part of the workforce, are unemployed.[9] • Median household income for enrollees was $35,000 compared to the U.S. median household income of $50,221 (for 2010).[10]
Increased expectations of rural care	*The VA Healthcare System will need to increase our capability to provide remote or non-traditional facility treatments for our enrollees.* Approximately 41% of enrollees live in rural or highly rural areas.[11] Overall 20% of the U.S. population lives in rural areas, while only 9% of physicians and 12% of pharmacists practice in rural areas.[12]. 3.6 million Veterans enrolled in the VA health care system live in rural or highly rural areas of the country.
Increased expectations of Internet and availability of information	*The VA Healthcare System will need to ensure Veterans and their dependents have quick, convenient, and personalized access to services and information.* *The VA Healthcare System will need to ensure WiFi or Cellular coverage in our facilities for patient use develop ways to leverage patient devices during encounters and treatments.* • VHA will continue to experience increased adoption of Personal Health Records (PHR). This will enhance patient empowerment, self-care, and will increase demand for additional quality of care and health education information. • Younger Veterans are more accustomed to easy access to information and expect a greater degree of service convenience. This generation is more amenable to social media and may access more information on a mobile device • Patients, either in-patients or out-patients, are becoming more and more tethered to their devices. Whether in waiting areas or in a room being treated, they expect to be able to use those devices to communicate with loved ones and lookup or verify information being provided to them by providers.

[7] 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 54

[8] 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 9.

[9] 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 8

[10] 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 8

[11] Volume 2, Issue 2, Nov 2011 VHA Office of Rural Health Fact Sheet

[12] Volume 2, Issue 3, Dec 2011 VHA Office of Rural Health Fact Sheet

TABLE 3. CHANGES IN VETERAN DEMOGRAPHICS AND NEEDS	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
Increase in female enrollees	*The VA Healthcare System will need to offer more women's health services.* Currently 6% of enrollees are women, with 12% of OEF/OIF/OND enrollees being women.[13] This number is expected to increase over time.
Increase in enrollees needing rehabilitation	*The VA Healthcare System will need to offer more rehabilitation health services.* Special needs of OEF/OIF Veterans will include severely injured, traumatic brain injury, post deployment health, blind rehabilitation, post-traumatic stress disorder (Post-Traumatic Stress Disorder [PTSD]), spinal cord injury (SCI), and seriously mentally ill (SMI).
Increase in Chronic Disease	*The VA Healthcare System will need to increase focus on effective management of Chronic Disease.* The VHA population of Veterans is experiencing increasing instances of diabetes, cardiovascular disease, and hypertension. This is consistent with national trends. Chronic disease management accounts for 75 percent of Health Care costs. Health economics, interventions, and communications have become paramount. It is imperative that VA maintains its leadership in Health Care quality, Population Health Management, management of chronic diseases, and Preventive Care Program.
Increased expectations of "convenient access" to resources	*The VA Healthcare System will need to invest in and embrace telemedicine.* The ability to provide home telehealth, telemental health, telerehabilitation, teleradiology, and teleretinal imaging will become critical. Telehealth will enable Veterans to receive medical care in their homes or in alternative settings, thus minimizing trips to medical facilities and maximizing Health Care access[14]. VHA will need to expand "real-time" virtual medicine (e.g., telehealth) to meet the needs of Veterans and their families (e.g., streaming/IP video on mobile devices). Other examples include Telepresence technologies to perform and monitor remote surgeries, and Psychologist Avatars for providing therapy to PTSD victims.
Changing Veteran Cohorts	*The Veteran population is expected to shift in composition and size over the next 20 years.* The largest cohort of Veterans in the next 20 years will be Iraq and Afghanistan Veterans. Because this cohort will be more technologically advanced, they will expect quicker access to information, healthcare and benefits. They will expect to receive health care irrespective of where they live and expect to track their health care and claims electronically. The Department, in order to provide this level of service, will have to better understand Veterans and their needs, become a more flexible organization, and integrate better within itself and other Departments. VA will have to ensure that its technological capabilities are sufficient to enable this service, and its workforce has the knowledge and skills to operate it.[15]

[13] 2011 Survey of Veteran Enrollee's Health and Reliance Upon VA, page 8

[14] http://vaww.telehealth.va.gov

[15] 2012 VA Strategic Environmental Assessment, p. 12

3.2.2 Changes in the Healthcare Business Industry

The Healthcare Industry as a whole faces several significant changes in drivers over the next few years. The anticipated changes and implications are described in Table 4.

TABLE 4. CHANGES IN HEALTHCARE BUSINESS INDUSTRY

LIKELY CHANGE	RESULTING RESPONSE AND DISCUSSION
Health care will be a national economic issue	*The VA Healthcare System will need to spend on IT only where that spending has clear Return-on-Investment.* *The VA Healthcare System will need to determine the best ways to allocate (limited) health care resources among our enrollees.* Health care consumes 16 percent of Gross Domestic Product (GDP) and is expected to reach $4 trillion or 20 percent of GDP by 2015[16] . Management of costs is fundamental to competitiveness and growing budget deficits.
Provider shortages will occur	*The VA Healthcare System will need to find ways to make itself attractive to providers and to allow providers to perform their work more efficiently and effectively.* There is increasing evidence of provider shortages nationally in areas such as Nursing, Emergency Medicine, Radiology, Primary Care, etc. An aging population and greater need for care exacerbate this shortage. There is also an aging of provider population.
New business models will emerge	*The VA Healthcare System will need to adapt to or embrace new business models of healthcare.* Some emerging business models anticipated to impact VHA are: • Long-term care in non-institutional settings • Customer-centric delivery models • Increase in Single Specialty Clinics • Health care/primary care through retail outlets (e.g., Wal-Mart) • Virtual/mobile pharmacy • Non-provider entrants and health information websites[17]
Quality and outcome focused care becomes the national expectation	*The VA Healthcare System will need to continuously leverage data about quality, cost, access, and satisfaction to improve our business processes and foster a culture of patient safety.* Flow improvement initiatives will result in streamlining of clinical and administrative business processes (e.g., wait times and access issues, bed optimization). This will positively impact usability and workflow design. VHA will continue to leverage work emanating from collaborative and industry best practices such as Institute for Health Care Improvement[18]. VHA will adopt Centers for Medicare and Medicaid (CMS) methodology to estimate avoidable hospital admissions.

[16] Source CMS

[17] Examples include WebMD Health, Dossia—dossia.org, Microsoft E-vault

[18] http://www.ihi.org

TABLE 4. CHANGES IN HEALTHCARE BUSINESS INDUSTRY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
Medical Identity Theft becomes more prevalent	*The VA Healthcare System will need to increase focus on detecting and preventing medical identity theft.* There is increasing awareness of medical identity theft and the need for holistic health information protection and monitoring. Such issues are more profound with the use a Personal Health Records. According to a 2011 study, 1.42 million Americans were victims of medical identity theft in 2010 (Poneman Institute study on patient data privacy and security.) The FBI estimate Health Care Fraud is costing American taxpayers up to $234 billion annually. Data breaches put patient data at risk for medical identity theft.
Increasing necessity of integrated, cross-provider, health record exchange	*The VA Healthcare System will need to increase our capability for electronic health record exchange with other entities.* Interoperability with federal, private, and other Health Care entities is possible as evidenced by the recent pilot tests between VA, DoD, and Kaiser Permanente and Med Virginia to achieve coordinated care for wounded warriors. VLER will drive NwHIN development and adoption, leading to on-demand, interoperable, and electronic record portability across federal and private sector service providers. CMS, DoD, SSA, and VA are also advancing NwHIN Exchange along with Kaiser Permanente, Marshfield Clinic, MedVirginia, Regenstrief Institute and others. NwHIN will enable the sharing of health information among private organizations as well as between private organizations and governmental agencies. NwHIN Exchange has cut disability determination at SSA in some instances from 84 days to 45 days. The Office of National Coordinator is continuing to address governance issues for NwHIN.
Medical research advances occur in Proactive Care	*The VA Healthcare System will need to incorporate Proactive Care advances in our workflows and systems.* The advancements will be clear predictive informatics capable of providing evidence-based decision support at the point of care.
Population Health & Health Equity	*The VA Healthcare System will need to incorporate core principles of population health and Health Equity* The VA Healthcare System will need to shift to not only providing excellent care for individual Veterans but also ensuring the health of the entire Veteran population. There is an increasing focus in Meaningful Use and health care paradigms to ensure health care is delivered equitably and that entire populations can be addressed in decision-making.
Personalized Genomic Medicine becomes viable on a system wide basis	*The VA Healthcare System will need to train our practitioners in genomic medicine and implement supporting workflows and systems.* The influence of genomics, proteomics, and bioinformatics are profound[19]. VA's Office of Research and Development (ORD) is beginning to implement genome databases for mining (GenISIS—Genome Information System for Integrated Science). Genomics will drive personalized medicine (e.g., personalized therapy, drug dosage), pre-emptive medicine, and become integrated with clinical care,

[19] Companies such as 23andMe (https://www.23andme.com/) have marketed personal access to genetic information and enabling patient-driven research.

TABLE 4. CHANGES IN HEALTHCARE BUSINESS INDUSTRY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
	beginning with family history. VHA is integrating assessments, genetic, military exposure, health and life style information through GenISIS as part of the Million Veterans Program (MVP) Initiative—expected to become world's largest database for health and genetic information. VHA will conduct health and wellness studies to determine which genetic variations are associated with particular health issue. Thus, advancing medical care that is personalized based on person's genetic makeup. As an example, VHA is beginning to apply MVP data to study Seriously Mentally Ill Veterans. From a cost perspective, the price points in sequencing the individual genome have dropped to affordable levels. Care practitioners will need to be trained in the application of genomic medicine and proper use (including, recognition of ethical and privacy issues) of genomic data within the context of an EHR. For example, integration of genomic and phenotypic information into EHR to facilitate decisions related to surgery, treatment, and drug regimens. Genomics will enhance VHA's capability for chronic disease prevention and management. It may transform clinical trials based on population stratification.
Advancements in logistics, supply chain, and revenue cycle management expectations	*The VA Healthcare System will need to adopt processes and systems supportive of supply chain and revenue cycle management.* This includes VHA's emerging investments in complete revenue cycle, medical logistics, and supply chain capabilities, including tracking and obtaining full visibility/situational awareness of resources: medical supplies, patients, care providers, transport equipment, facilities, biologics, lab specimens, and other medical assets.

3.2.3 Changes specific to VA / Government Legislation and Guidance

Table 5 provides the key changes expected to impact the VA Healthcare System because it is a government department.

TABLE 5. CHANGE AS PART OF GOVERNMENT

LIKELY CHANGE	RESULTING RESPONSE AND DISCUSSION
Implications from the Affordable Care Act (ACA)	*ACA is expected to have implications for VA.* Enrollment changes may occur as Veterans respond to the new options that are available to them; VA IT systems will need to be in compliance with the information exchange and verification requirements of ACA; increased national demand for health care will increase the demand for health care providers, which will have implications for VA; ACOs may have implications for Veterans and VA in the areas of quality and access care outside of the VA health care system, physician recruitment, and opportunities for collaboration Additionally when ACA is fully implemented, it will give some Veterans the option to decide whether to use VA for health care, or choose care outside of the VA health care system; depending on where Veterans live, and their income levels, they may become eligible for Medicaid or a premium tax credit to purchase health coverage through the Health Insurance Marketplace.[20]
Increased expectation for interoperability across the entire national health IT ecosystem	*The HHS Office of the National Coordinator (ONC) has published "Connecting Health and Care for the Nation: A 10-Year Vision to Achieve and Interoperable Health IT Infrastructure".* This paper describes ONC's broad vision and framework for interoperability and is an invitation to health IT stakeholders – clinicians, consumers, hospitals, public health, technology developers, payers, researchers, policymakers and many others – to join ONC in developing a defined, shared roadmap that will allow the nation to collectively achieve health IT interoperability as a core foundational element of better care, at a lower cost and better health for all. This will further drive requirements for VHA to interoperate, not only with DoD, but with the entire public and private health care ecosystem.
Implications from Federal Health IT Advisory Council Activities	*The Federal Health IT Advisory Council will be coordinating federal health IT policy decisions and program alignments to address existing and emerging health and health IT marketplace matters.* In April 2014, the National Coordinator for Health Information Technology requested Department or Agency's participation in the Federal Health Information Technology (Health IT) Advisory Council. The Council's mission is to coordinate federal health information technology (health IT) policy decisions within a forum to discuss program alignments for existing and emerging health and health IT matters. This coordination will serve first to prioritize strategies and define implementation accountabilities within the Federal Health IT Strategic Plan, and assist in establishment of performance indicators for the Federal Health IT Strategic Plan's goals and objectives. In addition, the Federal Health IT Advisory Council will serve to address high-priority issues that impact the evolution of the nation's health IT infrastructure.
Increased expectation	*The VA Healthcare System will need to improve processes and systems capable of*

[20] Affordable Care Act and VA factsheet, p. 1

TABLE 5. CHANGE AS PART OF GOVERNMENT	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
that VA provide leadership in public health and epidemiology	*supporting epidemiology and public health.* This will include initiatives in areas of emergency preparedness, deployment health, disease modeling and simulation[21], public health information sharing, and population health.
National Debt Implications	*As our nation's debt increases, VA may face challenges to providing benefits and services to Veterans.* The federal government's unsustainability of national commitments will have a significant impact on federal programs. Some services and programs within VA likely will be subject to change based on this unsustainability. Cuts or reductions in other federal funding programs may also increase the number of Veterans who apply for VA benefits. The VA would face a future where it has an increasing number of enrollees but has less funding and resources to provide services and benefits. The Department will need to rethink the way it meets its mission, diversify the way it connects with the Veterans and will require more flexibility to meet their mission through partnerships, contracting and technology.[22]
Cost of Health Care Delivery	*Due to the rising cost of health care delivery, VA could see a sizeable shift in enrollment and utilization.* VA may face the same increased costs as Medicare and Medicaid but will have to provide the same standard of services to the newly enrolled Veterans. In essence, they will have to do more with less. In order to achieve this goal, the VA will have to become a trusted partner by knowing and understanding what Veterans will need and expect from the VA. This will force the Department to examine new and cost efficient ways of providing services without compromising its quality of care and to provide care in a more integrated way.[23]
Perception of Government Services	*Frustration toward the federal government, and distrust in large political institutions are expected to remain over the next decade.* As attitudes toward government shift, use and reliance on government services will wane. The Department must be seen as a trusted partner to ensure it meets the needs of a customer base with increasing expectations. As private industry alternatives increase, the VA must be able to manage relationships and provide more integrated services for Veterans.[24]

[21] Examples include MRSA (Methicillin-resistant Staphylococcus aureus, a bacterium responsible for difficult-to-treat infections in humans), epidemic, HIV/AIDS, and pandemics

[22] 2012 VA Strategic Environmental Assessment, p. 14

[23] 2012 VA Strategic Environmental Assessment, p. 14

[24] 2012 VA Strategic Environmental Assessment, p. 15

3.2.4 Changes in Health Care Information Technology

Table 6 below outlines expected Information Technology changes with a potential to impact business practices, processes, and contribute to Health Care transformation.

TABLE 6. CHANGES IN HEALTH CARE INFORMATION TECHNOLOGY

LIKELY CHANGE	RESULTING RESPONSE AND DISCUSSION
Maturation and Broad Acceptance of Semantic Web	*The VA Healthcare System will need to leverage Semantic Web to enhance and enable improved information understanding and sharing.* Semantic Web (e.g., use of resource description framework) has profound implications in evolving Health Care business and information framework, medical terminologies, taxonomies, ontologies, etc.
Growth and Acceptance of Cloud Computing and Software as a Service	*The VA Healthcare System will need to leverage Software as a Service and Cloud Computing to focus efforts and investments on healthcare specific IT and reduce concerns and investments in non-direct healthcare systems.* Cloud computing views "everything" as a service (e.g., infrastructure, information, applications, software, platforms, and business processes). Cloud computing is being fueled by the convergence of high-speed networking, increasing computational power, web, network of inexpensive servers, and next generation consumer services[25]. While cloud computing presents opportunities for VHA, it must be balanced with security, privacy, and reliability concerns relative to protecting Health Care information and providing efficient Veteran services. Cloud computing has the potential to increase EHR adoption among small medical practices. Aside from certain EHR implementations moving to a cloud, there is also evidence in VHA about certain key ancillary systems moving to cloud (e.g., Lab). Health Care institutions are exploring registries, RxHub Prescriptions, storing and managing medical images in the cloud. The National Institute of Standards and Technology (NIST) have recently published Cloud Computing Reference Architecture and Standards Roadmap to spur standards development and adoption. Software as a Service (SaaS): Software will be delivered on-demand as a network-based service to reduce IT investment costs. HIT will be influenced and impacted by such utility-based approaches to computing as evidenced by numerous companies[26] making significant strides. In essence, Health Care applications could be owned, delivered, and managed remotely by one or more service providers. Service consumers will be charged in pay-per-use or subscription-based models. Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) are two other service models. EHRs built with cloud computing model can achieve privacy and security through business associate contracts with Cloud providers that specify compliance requirements (e.g., HITECH and Health Insurance Portability and Accountability Act Security Provisions), performance metrics, SLAs, liability sharing, backup, and contingency requirements.
Advancements in	*The VA Healthcare System will need to change processes and techniques to enable*

[25] Companies such as IBM, Google, Microsoft, General Electric (GE), and Amazon are making significant headway in exploring such disruptive and transformative technologies.

[26] Representative companies in this space—salesforce.com; electronic health record provider, Eclinicalworks, and AthenaHealth.

TABLE 6. CHANGES IN HEALTH CARE INFORMATION TECHNOLOGY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
Robotics	*broader use of robotics in providing care and enabling system operations.* VHA has applied robots into clinical workflow to handle medical supplies. Additionally, they have been applied for therapy (e.g., physical therapy, dementia). Other applications include surgery[27] and socially assistive robots that can coach, motivate, and monitor people with cognitive and physical disabilities.
Nanotechnology becomes mainstream	*The VA Healthcare System will need to develop approaches and systems for dealing with nanoinfomatics and nanomedicine.* VHA will be influenced by the emerging role of nanotechnology and nanomedicine to such applications as cancer, drug delivery, tissue repair, surgery, imaging, genetic testing, etc. This will lead to the development of nanoinformatics (e.g., concepts, taxonomies, data, and standards utilized in nanotechnology and nanomedicine).
Continued growth of Social Networks	*The VA Healthcare System will need to utilize Social Media in enhancing transparency and two-way communications with Veterans.* *The VA Healthcare System will need to develop ways to leverage social networks for care and disease surveillance.* Community-based and online collaborative environments already exist[28] and are proliferating. Social software applications integrate collaborative features, such as mash-ups, blogging, Wiki tools, search, news feeds, Voice over IP, e-mail, ranking/feedback, podcasts, document management, and workflow management. Security implications need to be addressed with these new technologies as well. Also, online communities have the potential to transform medical research (e.g., open source research). The convergence of wireless communications, social networking, and medicine is transforming health care. Social networking sites include VA's Facebook page (www.facebook.com/VeteransHealth) and www.curetogether.com. VA has established Facebook pages for all 152 of its medical centers.
Use of personal devices for medical data collection and interaction with healthcare providers.	*The VA Healthcare System will need to integrate with personal health data collection and provide two-way communications with Veterans regarding their health status and real-time data.* The private sector is moving forward with the planned use of personal devices, such as cell phones, to collect health data and automatically interact with patients. For example, on June 2, 2014, Apple announced a feature called Healthkit. According to Dr. John H. Noseworthy, CEO of the Mayo Clinic, Apple's HealthKit has the potential to "revolutionize how the health industry interacts with people." The Mayo Clinic is already working with Apple and HealthKit, creating an app that allows patients to monitor their blood pressure, sending alerts to doctors automatically.

[27] For example, da Vinci, application of robotics to Surgical Technology, www.Intuitivesurgical.com

[28] Examples: Open Source Infectious Disease Surveillance System (Trisano); real-time information on emerging infectious diseases at global health level (www.healthmap.org/en); communities based on diseases (e.g., Multiple Sclerosis, Parkinson's) www.patientslikeme.com; Open Prosthetics Project to make better prosthetic hands and arms for amputees; www.sermo.com, social networking for physicians

TABLE 6. CHANGES IN HEALTH CARE INFORMATION TECHNOLOGY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
Advancements in Radio Frequency Identification (RFID), wireless sensors, and implants	*The VA Healthcare System will need to continue to enhance our workflows to explOI&T RTLS, RFID, and advanced sensors.* VHA is already piloting RFID applications for high-value medical asset tracking. Other applications may include lab specimen identification and tracking, and patient identification. VHA is also prototyping Real-Time Locator Systems (RTLS) for flow and simulation initiatives. Increased adoption of RFID and RTLS is used for: hand hygiene compliance, change of shift reporting, asset tracking, anti-wandering, nurse call alerts, patient locating, staff locating, temperature monitoring, and role/location based user experience and work allocation (e.g., Smart Room). Smart skin, an epidermal electronic system, will lead to new biomedical applications—monitoring heart, muscles, and brain. It'll also provide wearers freedom of movement, and lead to the creation of new human computer interfaces. Smart clothing with probes and sensors is another trend. Wearable and implantable sensors enables to spot disease at an early stage (Diabetes, or pacemaker implants inspected and monitored over mobile phones for heart conditions). Sensors based on Bluetooth technology can measure glucose levels, electrocardiogram (ECG), blood counts, oxygen levels, blood pressure, weight, and upload data to web server. Both patients and doctors can manage and monitor those conditions. Finally, sensors may be embedded in the home to monitor the well-being of the occupant (long-term and home care) of home providing a glimpse of next generation home health monitoring. Standards development work by Continua will be pivotal. Recently, the FCC has designated bandwidth for Medical Body Area Network (MBAN). These networks will transmit data from remote sensors attached to patients to control devices. Wireless devices that operate on MBAN spectrum can be used to actively monitor patient's health and vitals—e.g., blood glucose, ECG readings.
"Bring your own Device" becomes the expectation	*The VA Healthcare System will need to adopt strategies for "bring your own device" to work.* Smart phones, tablets, and iPod-like devices will find their way into clinic and will significantly empower care provider, including location-aware services/interventions, Smart phone VistA, Computerized Patient Record System (CPRS), wireless health portal, secure remote monitoring of patients, etc.
Advances occur in analytics, clinical decision support, and training aids	*The VA Healthcare System will need to increase the use and complexity of Clinical Decision support and Analytics tools.* This includes VHA's investment in corporate data warehousing, predictive analytics, text mining, cost and workload analyses, utilization management, mining social networks, and understanding patterns of care. VHA will establish a robust computing base to support research (e.g., biomedical research, clinical research, epidemiological research, Disease Modeling, Health Care policy, health economics, comparative effectiveness research, and public health informatics). VHA will seize

TABLE 6. CHANGES IN HEALTH CARE INFORMATION TECHNOLOGY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
	"Big Data" Technology trends and provide an environment for data innovation, experimentation, and advanced analytics to its diverse stakeholder base at lower price points. Because of the unique demographics, high quality, sustained (and longitudinal) care, and VHA's renowned EHR, VHA possesses treasure trove of clinical trials data that may spur new innovation in drugs and devices. The explosion in data growth (structured and unstructured data, social media data, and genomic data), ubiquity of commodity servers, and open source software are also driving big data analytics being generated at high speeds. These emerging initiatives may require revised data policy and privacy framework in VHA. VHA will lead the development of next generation follow-up, quality dashboards, and reminder systems for patients and provider alike (e.g., evidence-based clinical decision support [CDS] at the point of care that is personalized and actionable). These CDS tools are integrated with workflow and will identify gaps in care, create care plans, offer treatment opportunities, provide drug reference, provide clinical guidance, and safety alerts. VHA will lead Health Care optimization initiatives by applying predictive modeling and advanced simulation techniques (e.g., discrete events, agent-based). These predictive modeling and advanced simulation tools can be weaved into clinical decision support infrastructure (e.g., diabetes care), care giver training aids (e.g., ophthalmology), modeling Patient-Aligned Care Teams (PACT), and flow management (e.g., emergency room). Also, simulation tools can assist in medical training[29] (e.g., virtual reality simulation in neurologic surgery). Tools such as IBM's Dr. Watson integrate Natural Language Processing and Machine Learning to improve diagnostic accuracy. It becomes another CDS aid by suggesting therapeutic decisions with varying degrees of confidence. These tools are critical toward VHA's Health Management Platform.
Continued maturation and adoption of mobile platforms	*The VA Healthcare System will need to ensure our IT systems are available on mobile platforms.* *The VA Healthcare System will need to examine our healthcare delivery model for ways mobile platforms can improve our outcomes, efficiency, and patient satisfaction.* Statistics and Use Cases to deploy new models of health care using mobile health technologies are compelling. According to Juniper Health, a UK-based industry analyst firm, the number of patients monitored by mobile health networks (e.g., cardiac care, chronic disease management) is expected to rise to 3 million by 2016. 44 million mobile health applications are expected to be downloaded this year, rising to 142 million by 2016. According to Research2Guidance2010, 500 million people are expected to manage health concerns using smartphone by 2015. A sampling of capabilities enabled by mobile health applications include: wellness awareness, remote data collection, remote monitoring, disease and epidemic surveillance, diagnostic and treatment support, personal health records, clinical decision support, 3D images display and navigation, triage for ER settings, secure

[29] The Simulation Learning Education and Research Network (SimLEARN) is building its national center on the campus of the new Orlando Veterans Affairs Medical Center (VAMC) (www.simlearn.va.gov).

TABLE 6. CHANGES IN HEALTH CARE INFORMATION TECHNOLOGY	
LIKELY CHANGE	**RESULTING RESPONSE AND DISCUSSION**
	messaging, and home telehealth. VA's care coordination study has documented 25% reduction in bed-days, and 20-50% reduction in hospitalization. The PTSD Coach – a smartphone application—is another success story. FDA continues to provide regulatory clarity. Mobile applications need to maintain patient context, and patient safety cannot be compromised. The Office of National Coordinator for Health IT is expected to release more security and privacy rules for mobile health. Other technical considerations may include governance, policies for mobile health devices, data stewardship, security, patient-entered data, and ubiquity of VA's apps store. Additionally, a recently published Digital Government Strategy[30] affirms mobile mandate that each agency deploy at-least two Government Services available to the public via mobile technology.
Advances in User Interface Technology	*The VA Healthcare System needs to translate advances in user interface technology into improved outcomes and more efficient healthcare.* This includes advanced capabilities/features for medical documentation including but not limited to voice/speech recognition, natural language processing, digital pens, etc. Computer assisted physician documentation may ease the transition to ICD-10. Clinical Documentation tools are also embedded with medical terminology.

[30] Digital Government Strategy was published by the White House and is available at: http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government-strategy.pdf.

4 RESULTING LONG TERM GOALS AND STRATEGIES

4.1 HEALTH INFORMATION GOAL 1

Goal 1	**Establish VHA Strategy and HIT Alignment Through the PPBE and Prioritization Processes to Ensure Effective Long Term HIT Investment Planning**

Includes triggering events and responses of:

- *Health care will be a national economic issue:* The VA Healthcare System will need to spend on IT only where that spending has clear Return-on-Investment.
- *Health care will be a national economic issue:* The VA Healthcare System will need to determine the best ways to allocate (limited) health care resources among our enrollees.
- *Growth and Acceptance of Cloud Computing and Software as a Service:* The VA Healthcare System will need to leverage Software as a Service and Cloud Computing to focus efforts and investments on healthcare specific IT and reduce concerns and investments in non-direct healthcare systems.

Overall strategic approach to achieving this goal:

- Align business requirements and business architecture with HISP, VA Strategic Plan, VHA Strategic Plan, VA Enterprise Roadmap, VA IRM Strategic Plan, OIA Strategic Plan, VISNs, and Program Office Strategic Plans.
- Integrate HISP goals with the PPBE process to effectively reach the goals over multiple budget cycles and deliver health care results.
- Incorporate business performance measures into business cases for business and IT investments to help prioritize investments and provide a means to measure success downstream.
- Leverage the ONC Health Information Technology Strategic Plan (update planned for 2014) as appropriate. Additionally plan for the strategic impact of the Health Information Technology for Economic and Clinical Health (HITECH) Act and Meaningful Use drivers.
- Leverage/align HISP for VHA Health Information Technology Prioritization.
- Enable Secretary's priorities (e.g., Improve Veteran Access to VA Benefits and Services, etc.).
- Be adaptive to emerging business models/new models of care (e.g., VHA's PACT, Expanded Virtual Medicine, Telehealth).
- Support legislative, accreditation, and regulatory mandates (e.g., the Joint Commission, OMB, VA Directives, and National Defense Authorization Act [NDAA]).
- Develop credible enterprise sequence and transition plans (road maps).
- Support core and future HIT/IHP strategies, including acquisitions planning.

4.2 HEALTH INFORMATION GOAL 2

Goal 2	**Enhance Secure Information Exchange with Business Partners: Federal, State, Regional, Local, Tribal, and Commercial**

Includes triggering events and responses of:

- *Increase in use of external (non-VA) providers:* The VA Healthcare System will need to increase our capability to exchange the health record with external providers.
- *Increasing necessity of integrated, cross-provider, health record exchange:* The VA Healthcare System will need to increase our capability for electronic health record exchange with other entities.
- *Maturation and Broad Acceptance of Semantic Web:* The VA Healthcare System will need to leverage Semantic Web to enhance and enable improved information understanding and sharing.

Overall strategic approach to achieving this goal:

- Provide strategic, tactical, and operational support to implement VLER and VistA Evolution.
- Leverage/align with VA's privacy, security, identity management, and other OneVA IT strategies and policies.
- Align with VA- and DoD-adopted standards (e.g., HL7 EHR and personal health record system function model).
- Enable VA-DoD and other business partner integration and interoperability efforts (e.g., iEHR, advancing Veterans health, FHCC, FHIE, BHIE, Clinical/Health Data Repository (CHDR), NwHIN, public health reporting, Veterans health research, Microsoft Health Vault, Open Source[31]).
- Develop VA-DoD common performance measures, requirements, business architecture, data and services (including Common Information Interoperability Framework—CIIF, terminology models), data centers, interface standards, common services broker, data exchange standards, and presentation layer (iEHR GUI).
- Achieve joint development/acquisition of a number of functional capabilities/applications (e.g., pharmacy, lab, blood bank, dental, immunization) for iEHR using business rules expressed in the joint VA/DoD memo dated 3/25/2011.
- Coordinate North Chicago FHCC efforts with iEHR (moving forward jointly for the remaining capabilities not yet delivered).
- Institute common Governance for iEHR.[32]

4.3 HEALTH INFORMATION GOAL 3

Goal 3	Support Information Needs for Public Health Care Research and Policy Analyses

Includes triggering events and responses of:

- *Increased expectation that VA provide leadership in public health and epidemiology:* The VA Healthcare System will need to improve processes and systems capable of supporting epidemiology and public health.

[31] VA's custodial agent's portal link: www.osehra.org

[32] The charters for Health Architecture Review Board, Informatics and Clinical Information Board, and Health Executive Council IM/IT have been signed and jointly established

Overall strategic approach to achieving this goal:

- Enable chronic disease management, care management, and population health management.
- Enable health outcomes and economic research (corporate and regional analytics to develop an understanding of utilization, quality of care, and comparative effectiveness research).
- Enable the development of genomics and bioinformatics.
- Support registries to enhance health community, public health, and Veterans research.
- Enable the development of evidence-based care.
- Advance privacy and security principles and protections for information access.
- Support MRSA Research and Development (R&D) initiatives.
- Develop mental health informatics.
- Support utilization management studies.

4.4 HEALTH INFORMATION GOAL 4

Goal 4	**Empower Veterans and their Families with Health IT to Improve their Overall Health Care Quality and Provide Convenient / Mobile Access**

Includes triggering events and responses of:

- *Increased expectations of Internet and availability of information:* The VA Healthcare System will need to ensure Veterans and their dependents have quick, convenient, and personalized access to services and information.
- *Medical Identity Theft becomes more prevalent:* The VA Healthcare System will need to increase focus on detecting and preventing medical identity theft.
- *Personalized Genomic Medicine becomes viable on a system wide basis:* The VA Healthcare System will need to train our practitioners in genomic medicine and implement supporting workflows and systems.
- *Continued maturation and adoption of mobile platforms:* The VA Healthcare System will need to examine our healthcare delivery model for ways mobile platforms can improve our outcomes, efficiency, and patient satisfaction. The VA Healthcare System will need to ensure our IT systems are available on mobile platforms.
- *Continued growth of Social Networks:* The VA Healthcare System will need to utilize Social Media in enhancing transparency and two-way communications with Veterans.
- *Advancements in Radio Frequency Identification (RFID), wireless sensors, and implants:* The VA Healthcare System will need to continue to enhance our workflows to explOI&T RTLS, RFID, and advanced sensors.
- *"Bring your own Device" becomes the expectation:* The VA Healthcare System will need to adopt strategies for "bring your own device" to work.
- *Increased expectations of "convenient access" to resources:* The VA Healthcare System will need to invest in and embrace telemedicine.

- *Increased expectations of rural care:* The VA Healthcare System will need to increase our capability to provide remote or non-traditional facility treatments for our enrollees.
- *Utilize Patient-Generated Information*: Use patient-generated information to enhance health care quality and the patient experience.

Overall strategic approach to achieving this goal:

- Support VHA System Redesign Strategies (e.g., reduce costs, improve cycle times, eliminate waste, and improve flow) and Initiatives such as emergency department, bed control, and surgery quality workflow leveraging system redesign principles.
- Support point of service (self-service) Kiosk initiative.
- Utilize medical devices within VHA that can integrate with Veteran devices as appropriate and provide a Veteran access to their medical data.
- Enable VHA's full transition to ICD-10, and supporting meaningful use.
- Enable next generation My HealtheVet to include social networking among Veterans and their dependents, patient-centered health capabilities, and secure messaging.
- Support advanced logistics, supply chain, and revenue cycle initiatives.
- Enable Telehealth, Telepathology, Teledermatology, Home Telehealth, Telemedicine Support, Mobile Clinics, Real-time visibility and transparency, RTLS/RFID, mobile health, and next generation wireless broadband initiatives.
- Enable upgrade/consolidation of telephone and video teleconferencing infrastructure to support new business models.
- Collaborate with Veterans Relationship Management (VRM) initiative.
- Enable SaaS and cloud computing initiatives in VA.
- Support Patient Aligned Care Team initiatives.
- Enable readjustment counseling for women Veterans.
- Improve access to health IT for all Veterans, including rural Veterans, to enhance their health and the VA / Veteran relationship.
- Collaborate with industry communities such as Continua Health Alliance.

4.5 HEALTH INFORMATION GOAL 5

Goal 5	**Enhance Health Information Processes and Practices to Ensure that VA Health Systems are Efficient and Cost Effective, and have the Capability Needed to Deliver the Highest Level of Medical Care to our Veterans**

Includes triggering events and responses of:

- *Advances occur in analytics, clinical decision support, and training aids:* The VA Healthcare System will need to increase the use and complexity of Clinical Decision support and Analytics tools.

- *Medical research advances occur in Proactive Care:* The VA Healthcare System will need to incorporate Proactive Care advances in our workflows and systems.
- *Increase in Chronic Disease:* The VA Healthcare System will need to increase focus on effective management of Chronic Disease.
- *New business models will emerge:* The VA Healthcare System will need to adapt to or embrace new business models of healthcare.
- *Increase in female enrollees:* The VA Healthcare System will need to offer more women's health services.
- *Increase in enrollees needing rehabilitation:* The VA Healthcare System will need to offer more rehabilitation health services.
- *Possible rapid fluctuation in enrollees desiring treatment:* The VA Healthcare System will need to be able to expand and contract rapidly in response to shifting demands.
- *Advancements in Robotics:* The VA Healthcare System will need to change processes and techniques to enable broader use of robotics in providing care and enabling system operations.
- *Nanotechnology becomes mainstream:* The VA Healthcare System will need to develop approaches and systems for dealing with nanoinfomatics and nanomedicine.
- *Provider shortages will occur:* The VA Healthcare System will need to find ways to make itself attractive to providers and to allow providers to perform their work more efficiently and effectively.
- *Quality and outcome focused care becomes the national expectation:* The VA Healthcare System will need to continuously leverage data about quality, cost, access, and satisfaction to improve our business processes and foster a culture of patient safety.
- *Advances in User Interface Technology:* The VA Healthcare System needs to translate advances in user interface technology into improved outcomes and more efficient healthcare.

Overall strategic approach to achieving this goal:

- Support Hospital Quality Transparency Initiatives (e.g., CMS Hospital Compare, VHA Hospital Card, and Quality Measures for Accountable Care Organization).
- Utilize business intelligence and architected solutions to fully leverage health data to increase cost effectiveness and the quality of data available to practitioners.
- Define the full range of business processes related to unmet requirements to identify opportunities to better facilitate business processes that transcend organizational boundaries.
- Enable transparency, communities of practice, blogs, and social networks (e.g., personal health records, rural health, women's health, chronic diseases, PTSD, Traumatic Brain Injury [TBI], prosthetics, innovation).
- Enable next generation CPRS (e.g., patient-centered medical home enhancements), physician order entry, e-prescribing systems with physician collaboration, discharge planning and follow-ups, wikis, and web 2.0 oriented clinical decision support tools.
- Leverage work products from "user design center" leading to smarter user interfaces—facilitating workflow and context-driven views.

- Support preventive care programs (Health Risk Assessments).
- Transition VHA's EHR to a Health Management Platform that is patient-, provider-, and system-facing, integrated, agile, knowledge-driven, and role- and context-based.
- Develop and institutionalize enterprise-level processes for requirements management, requirements validation, governance, usability effectiveness, risk management, portfolio management, knowledge management, configuration management, and change management.
- Mature BA products and enable advanced visualization, architecture analyses, knowledge management, OIA investment decision support, and secure a comprehensive architecture tooling solution.
- Standup BA, information, and data governance and compliance processes.
- Focus on training and processes supporting a "culture of safety".
- Fully integrate the innovation processes into OIA's requirements management process.
- Enhance collaboration with OI&T in areas such as requirements, architecture, product validation, ease of adoption, and HIT acquisition strategies (including agile systems development life cycle).
- Enhance collaboration with VBA's BA efforts.
- Implement an integrated communications/outreach approach.
- Establish a BA Center of Excellence in VHA.

Appendix A. VHA STRATEGIC FRAMEWORK

This section introduces VA and VHA strategic elements that form the basis of the VHA Strategic Architecture. This section demonstrates the linkage between the VHA Strategic Architecture to performance measures, prioritization criteria, and the VHA business function framework.

A.1 VA MISSION, GUIDING PRINCIPLES, STRATEGIC GOALS, CORE VALUES

VA Mission: The Department of Veterans' Affairs (VA) is responsible for a timeless mission: To fulfill President Lincoln's promise – "to care for him who shall have borne the battle, and for his widow, and his orphan" -- by serving and honoring the men and women who are America's Veterans.

VA Vision: Our vision is of a VA transformed into a high-performing 21st century organization – one that adapts to new realities, leverages new technologies, and serves a changing population of Veterans with renewed commitment. VA is building an institution around three guiding principles:

- *People-centric:* Veterans and their families are the centerpiece of our mission and of everything we do. Equally essential are the people who are the backbone of the Department – our talented and diverse workforce.
- *Results-driven:* We will be measured by our accomplishments, not by our promises.
- *Forward-looking:* We will seek out opportunities for delivering the best services with available resources, continually challenging ourselves to do things smarter and more effectively.

VA Strategic Goals: VA has four strategic goals that represent the top priorities of the Department:

- Improve the quality and accessibility of health care, benefits, and memorial services while optimizing value.
- Increase Veteran client satisfaction with health, education, training, counseling, financial, and burial benefits and services.
- Raise readiness to provide services and protect people and assets continuously and in time of crisis.
- Improve internal customer satisfaction with management systems and support services to achieve mission performance and make VA an employer of choice by investing in human capital.

To support the strategic goal VA has three integrated objectives and fourteen associated integrated strategies. The integrated objectives provide a common set of premises upon which operational strategies and initiatives are based. Three sets of associated strategies correspond to each of the three integrated objectives. The integrated strategies are the ways and means, or courses of action, that have been designed to realize VA's objectives. The VA integrated objectives and strategies are articulated in Table 7.

TABLE 7. VA INTEGRATED OBJECTIVES AND ASSOCIATED INTEGRATED STRATEGIES

INTEGRATED OBJECTIVE	INTEGRATED STRATEGIES
1. Make it easier for Veterans and their families to receive the right benefits, meeting their expectations for	a) Improve and integrate services across VA to increase reliability, speed, and accuracy of delivery. b) Develop a range of effective delivery methods that are convenient to Veterans and their families. c) Improve VA's ability to adjust capacity dynamically to meet changing needs,

TABLE 7. VA INTEGRATED OBJECTIVES AND ASSOCIATED INTEGRATED STRATEGIES

INTEGRATED OBJECTIVE	INTEGRATED STRATEGIES
quality, timeliness, and responsiveness.	including preparedness for emergencies. d) Provide Veterans and their families with integrated access to the most appropriate services from VA and our partners. e) Enhance our understanding of Veterans' and their families' expectations by collecting and analyzing client satisfaction data and other key inputs.
2. Educate and empower Veterans and their families through proactive outreach and effective advocacy.	a) Use clear, accurate, consistent, and targeted messages to build awareness of VA's benefits amongst our employees, Veterans and their families, and other stakeholders. b) Leverage technology and partnerships to reach Veterans and their families and advocate on their behalf. c) Reach out proactively and in a timely fashion to communicate with Veterans and their families and promote Veteran engagement. d) Engage in two-way communications with Veterans and their families to help them understand available benefits, get feedback on VA programs, and build relationships with them as our clients.
3. Build our internal capacity to serve Veterans, their families, our employees, and other stakeholders efficiently and effectively.	a) Anticipate and proactively prepare for the needs of Veterans, their families, and our employees. b) Recruit, hire, train, develop, deploy, and retain a diverse VA workforce to meet current and future needs and challenges. c) Create and maintain an effective, integrated, Department wide management capability to make data-driven decisions, allocate resources, and manage results. d) Create a collaborative, knowledge-sharing culture across VA and with DoD and other partners to support our ability to be people-centric, results-driven, and forward-looking at all times. e) Manage physical and virtual infrastructure plans and execution to meet emerging needs.

Core Values describe an organization's culture and character, and serve as the foundation for the way individuals interact with each other, as well as with people outside the organization. Our unique VA Core Values and Characteristics underscore our moral obligation to Veterans, their families, and other beneficiaries. The VA Core Values are:

- Integrity
- Commitment
- Advocacy
- Respect
- Excellence

A.2 VHA MISSION, VISION, STRATEGIC GOALS AND OBJECTIVES

This section outlines VHA mission, vision, principles, strategic goals and objectives for the next generation of the EHR.

VHA Mission: Honor America's Veterans by providing exceptional health care that improves their health and well-being.

VHA Vision: VHA will continue to be the benchmark of excellence and value in health care and benefits by providing exemplary services that are both patient-centered and evidence-based. This care will be delivered by engaged, collaborative teams in an integrated environment that supports learning, discovery and continuous improvement. It will emphasize prevention and population health and contribute to the Nation's well-being through education, research and service in national emergencies.

VHA Principles: meet its mission of providing exceptional care that improves the health and well-being of Veterans, VHA must continue to transform itself and become the health care system of the future. It must create and deliver health care value to America's Veterans, which means the provision of timely, accessible, effective health care and benefits in a way that is cost effective and satisfying to Veterans. To meet these needs, VHA has established VHA Principles that are the philosophical pillars that are embedded in VHA's vision:

- **Patient-Centered Care:** VHA is embracing patient-centered care, which means that VHA will design its extensive services around the individual needs, values, and preferences of our Veterans and their families. In order to be patient-centered, VHA will need to build an environment that is safe, secure, comfortable, and supporting of healing. VHA will become Veterans preferred provider of health care services.
- **Team Care:** Teams are the means for providing care and services in VHA's Health Care system. Teams will map their processes and define the roles and responsibilities of each member; they will be trained and proficient in team skills; and they will develop a stronger culture of civility, respect, trust, and integrity, and provide each team member opportunities to shape how to best do their work. Our teams will involve Veterans' families and internal customers as members of the team and collaborate with other teams to ensure fully coordinated care and services.
- **Continuous Improvement:** VHA is committed to continuous improvement as a core operating principle. This means that all levels of the organization will be involved from each employee to national programs in improvement efforts, understanding that "improving our work is our work." VHA will bring the knowledge and skills of system engineering to bear on all elements of the operation and promote a culture where every employee takes responsibility for the improvement of quality of care. VHA will ensure that continuous improvement efforts lead to results for immediate and long-term health outcomes for our Veterans.
- **Data-Driven, Evidence-Based Approach:** VHA will provide the highest quality of care to all Veterans using a data-driven, evidence-based approach. This means VHA will use sound measurement and analysis to identify successful practices and then methodically implement them across the organization and ensure high reliability in delivering evidence-based care. VHA will develop valid, useful metrics that cover all domains of health care quality, including effectiveness, safety, timeliness, patient-centeredness, cost effectiveness, and equity.
- **Population Health/Health Promotion:** VHA is increasingly focused on health promotion, disease prevention, and population health. VHA will assist Veterans in achieving healthier life styles and focus on reducing health risks. VHA will develop a system that measures health

outcomes for both individual Veterans and the Veteran community. VHA will develop systems to improve the health of the Veteran community, concentrating on those areas where supports outside VA are limited.

- **Health Care Value:** VHA will create health care value by reducing cost while maintaining and improving quality. VHA will accomplish this by reducing wasteful variation in clinical delivery, business processes, and organizational structures; utilizing skills of all staff to the full extent of their training and professional licensure; using specialty care effectively; and reducing costs by leveraging health informatics to decrease medical errors and improve staff productivity.

VHA's National Leadership Council (NLC) developed a strategic planning framework to accomplish its mission and achieve VHA's vision, as cited above. The VHA Strategic Framework shown below in Figure 6 guides planning and decision-making to enable VA to provide Veterans with health care that is personalized, proactive, and patient-driven. In support of the mission and vision, guided by VA Core Values and VHA Principles, it outlines the goals, objectives, measures, and strategies required to deliver results on our goals.

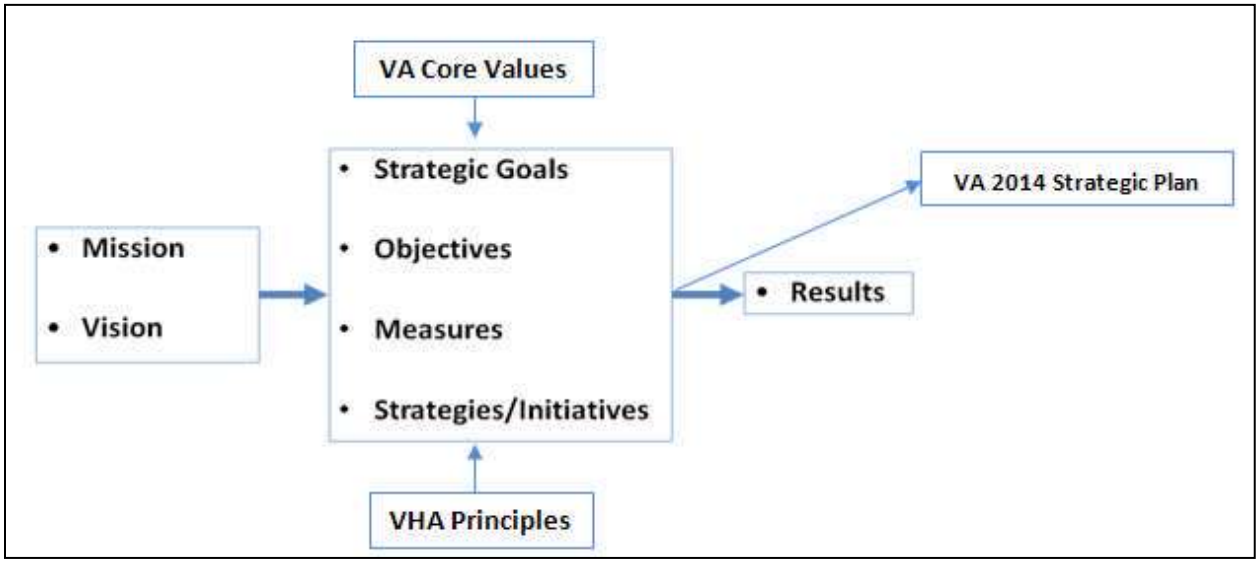

Figure 5 - VHA Strategic Framework

The VHA Strategic Framework identifies three goals and 17 associated integrated objectives. Following the National Leadership Council (NLC) Strategic Planning Summit in 2012, VHA leadership these strategic goals and objectives. Strategic Goals are results or outcomes the organization seeks to realize the vision, while objectives serve as concise, specific, tangible statements that explain how the organization will accomplish a goal. The VHA strategic goals and objectives are articulated in Table 7.

TABLE 8. VHA STRATEGIC GOALS AND OBJECTIVES

STRATEGIC GOALS	OBJECTIVES
1. Provide Veterans Personalized, Proactive, Patient-Driven Health Care.	a) VA Health Care Delivery – VA health care partners with each Veteran to create a personalized, proactive strategy to optimize health and well-being, while providing state-of-the art disease management. b) Communication – VHA will effectively communicate the VA model and strategy for delivering personalized, proactive, patient-driven health care to employees, Veterans, key partners and stakeholders, and will prepare our workforce to

TABLE 8. VHA STRATEGIC GOALS AND OBJECTIVES	
STRATEGIC GOALS	**OBJECTIVES**
	deliver this type of care. c) Awareness & Understanding – The VA model of personalized, proactive, patient-driven health care, which is delivered across the continuum from prevention through tertiary care and end of life, will be clearly defined and commonly understood as evidenced by survey results. d) Access to Information & Resources – Veterans will have convenient access to information about VA health benefits, their medical records, health information, expert advice, and the ongoing support needed to make informed health decisions and successfully implement their personal health plans. e) Quality & Equity – Veterans will receive timely, high quality, personalized, safe effective and equitable health care, irrespective of geography, gender, race, age, culture or sexual orientation. f) Innovation & Improvement – VHA will drive an improvement culture by advancing innovation trials, emerging health technologies, and experimentation, through exploration of both constructive failures and dynamic successes, adopting practices that improve care while minimizing and managing acceptable risk. g) Collaboration – VHA will strengthen collaborations within communities, and with organizations such as the Department of Defense, the Department of Health and Human Services, academic affiliates, and other service organizations.
2. Achieve measurable improvements in health outcomes.	a) Expectations – VHA performance expectations will be aligned to the VHA strategic goals. b) Incentives – Incentives will be in place for individual, team and organizational performance and results consistent with VHA strategic goals and objectives.
3. Align Resources to Deliver Sustained Value to Veterans.	a) Support Services – VA and VHA support services (e.g., contracting, human resources, information technology) will be aligned and coordinated in ways to ensure agile responses to VISN/program needs related to health care. b) Operational Processes – Clinical operations and business processes will be aligned to support implementation of the VA model of personalized, proactive, patient-driven health care, enabled through the reduction or elimination of distracting and unnecessary program mandates and underutilized physical resources. c) Resources – The Veterans Equitable Resource Allocation (VERA) model will be continually updated to better support personalized proactive, patient-driven health care. d) Agile Footprint – VHA health delivery system capital footprints will be right-sized and aligned consistent with market projections, while ensuring agility to allow for rapid adaptation to policy changes, divestiture of unnecessary facilities and land, and changing Veteran demographics. e) Capital Investments – Strategic Capital Investment Planning (SCIP) proposals submitted from VHA will be consistent with current fiscal realities, long-range strategic imperatives, and the VA model of personalized, proactive, patient-driven health care. f) IT Investments – Information technology investments will be prioritized and made timely to support personalized, proactive health care improvements in a

TABLE 8. VHA STRATEGIC GOALS AND OBJECTIVES	
STRATEGIC GOALS	**OBJECTIVES**
	highly responsive manner. g) Local Flexibility – There will be flexibility for appropriate local decision making (e.g., make vs. buy decisions) to address local variation in population needs, such that VISNs, VAMCs and market area health systems can adapt locally to maximize access to and quality of a consistent package of VHA health care services. h) Leadership–VHA will achieve a highly effective, innovative, data-driven, evidence-based, continuously improving, and reliable health care system. By 2017, the system will be nationally recognized as a leader for population health improvement strategies, personalized care, and maximizing health outcomes in a cost-effective and sustainable manner.

A.3 VA - VHA STRATEGIC ARCHITECTURE

In order to demonstrate full line-of-sight traceability between Department and Administration strategic planning initiatives, efforts have been undertaken to ensure the alignment of elements of both planning frameworks. VA integrated objectives and strategies have been aligned to corresponding strategic goals and objectives identified in the VHA Strategic Framework. This alignment ensures that all VHA objectives can be traced to Department-level integrated strategies, objectives, and ultimately the Secretary's Guiding Principles and the Department's Strategic Goals.

A notional diagram of the VA-VHA strategic alignment included as Figure 6 below. This example demonstrates how the need to provide VHA Information Technology support (VHA Objective 3(f) – Information Technology investments will be prioritized and make timely to support personalized, proactive health care improvements in a highly responsive manner) can be associated with corresponding Department-level integrated objectives and strategies.

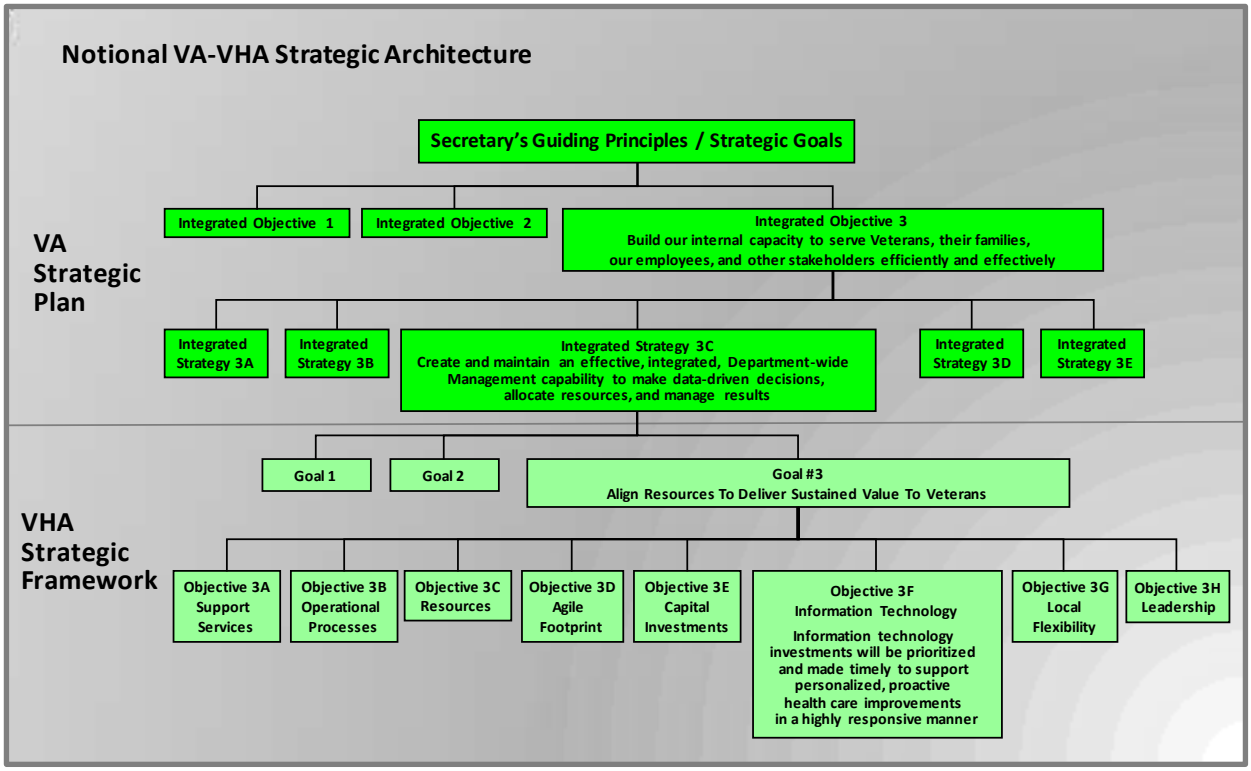

Figure 6 - VA-VHA Strategic Alignment

A.4 PERFORMANCE ARCHITECTURE LINKAGE TO STRATEGY

Work is underway to develop the full VHA performance architecture that will be aligned to the VA strategic architecture. To initiate this effort, VHA will measure progress toward achieving VA's and VHA's strategic goals and objectives through performance measures identified in key Department and Administration strategic planning documents. As the performance architecture matures, VHA will continue to develop and evolve performance measures.

A notional diagram of the VA-VHA performance architecture is depicted in Figure 7 below. This example identifies performance measures and accompanying metrics associated with a VA integrated strategy and a VHA objective.

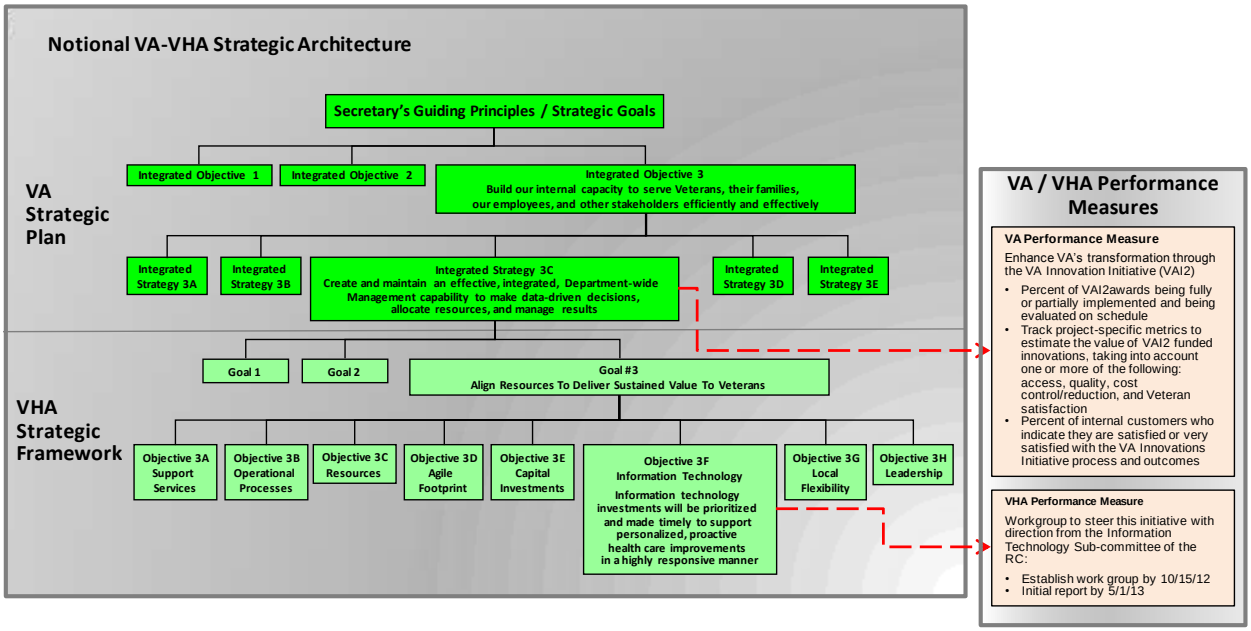

Figure 7 - Performance Linkage to Strategy

Figure 8 below illustrates the relationship between VHA / VA performance, investment prioritization, performance measurement, and operations. VHA / VA strategy can be defined as identification of the gaps between current and desired business performance in key areas as measured by performance measures across the spectrum of VHA operations. Investment prioritization would then be, in part, driven to select investments that will close the strategic performance gap, as documented by business cases. The implementation of investments closes the performance gap by improving selected business processes, which in turn improve VHA operations. VHA operational improvements are then validated through improved values of targeted performance measures. Improvements in specific business performance areas and external factors lead to adjustments in strategy and priorities over time.

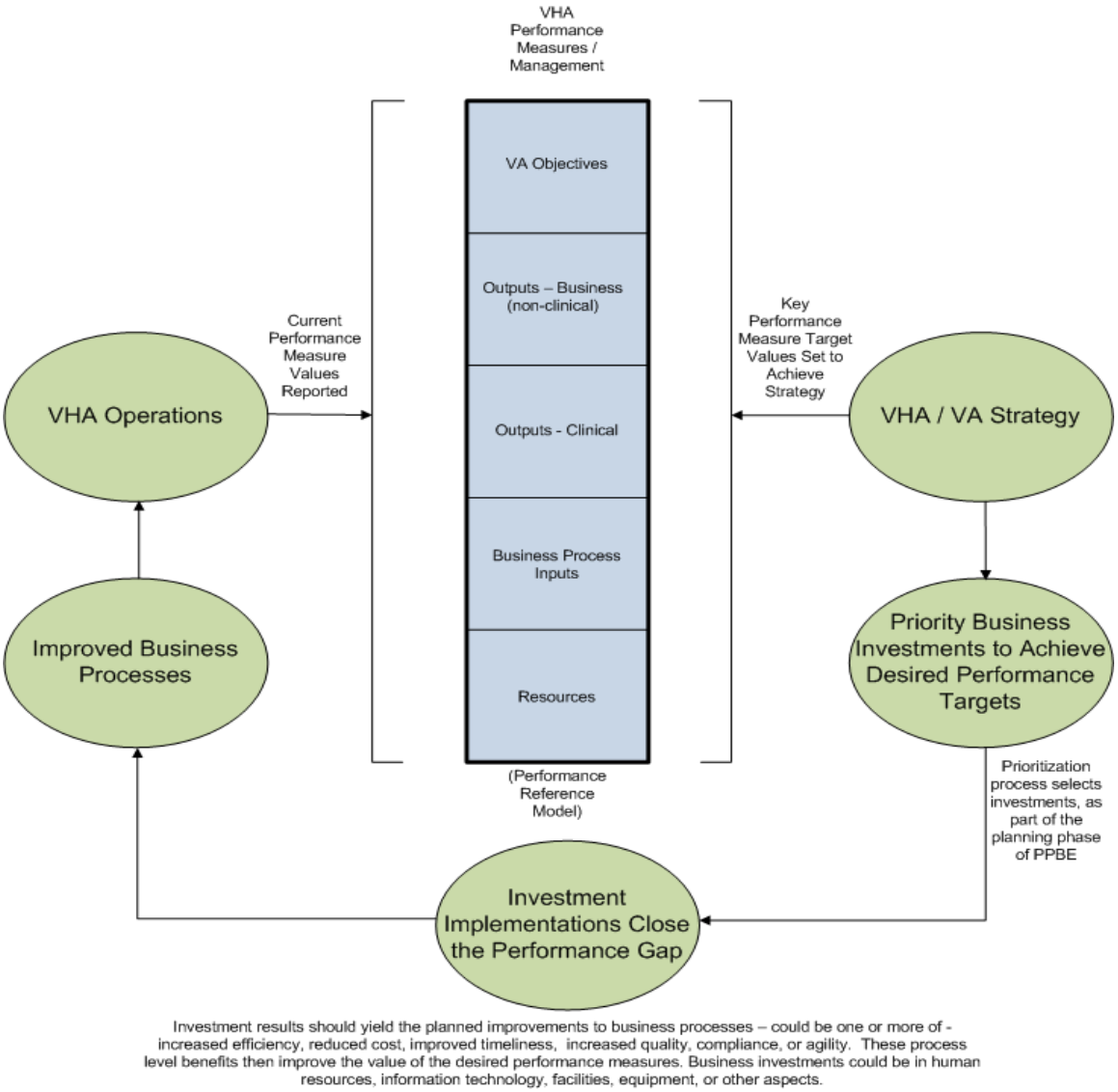

Figure 8 – Strategy, Investment and Performance Integration Drive Business Improvements

The goals in the HISP will also become a driver in the PPBE process as the PPBE process matures. Figure 9 below shows the notional positioning of the HISP in the PPBE and related processes.

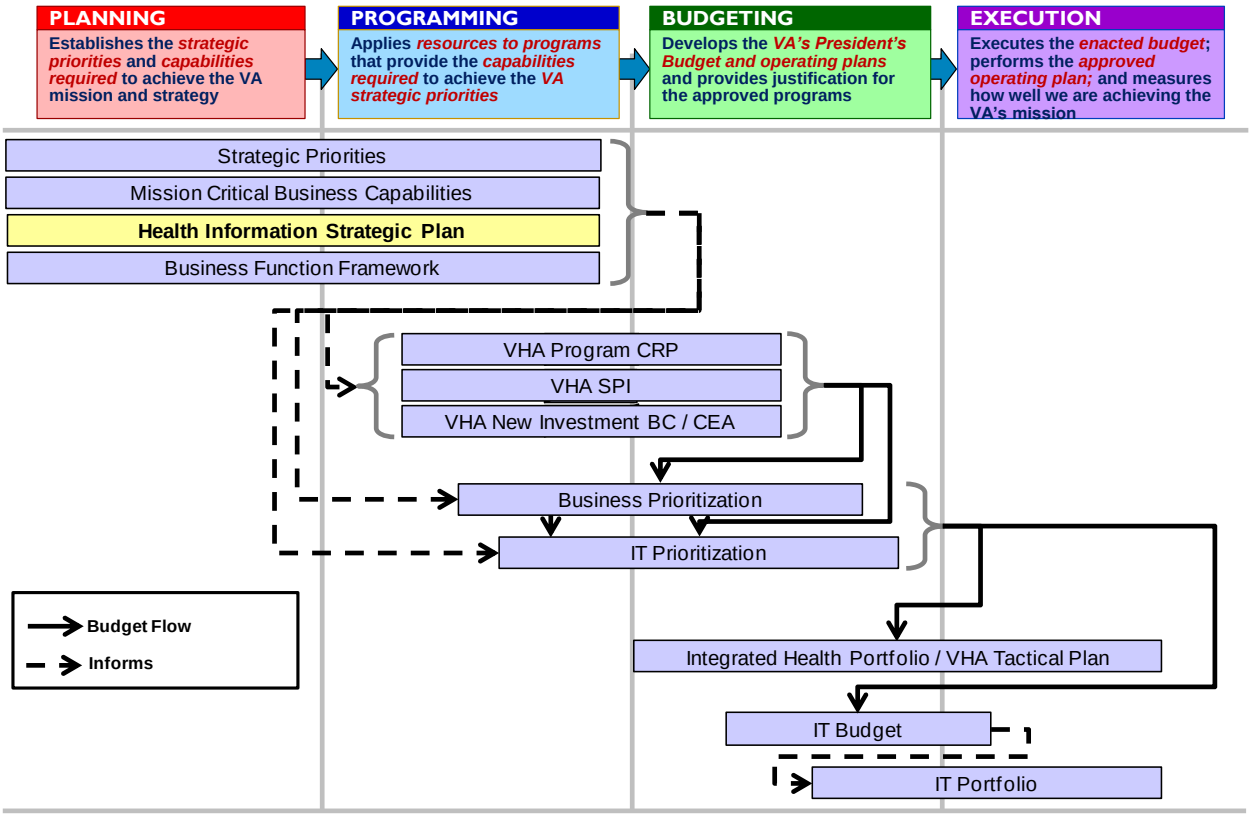

Figure 9 - Notional HISP Positioning in the PPBE Process

A.5 PRIORITIZATION CRITERIA LINKAGE TO STRATEGY

The VHA Strategic Investment Management (SIM) organization is currently revising the process that will be used to prioritize the acquisition and/or development of needed IT and non-IT capabilities to support the VHA mission. As part of this effort, SIM will need to be able to demonstrate a direct line-of-sight traceability between the specific prioritization criteria and elements of the VHA Strategic Framework.

A notional diagram that demonstrates the linkage between the VHA IT prioritization criteria and the VHA Strategic Framework is depicted in Figure 10 below. The VHA Strategic Framework will be leveraged to help develop future VHA prioritization criteria.

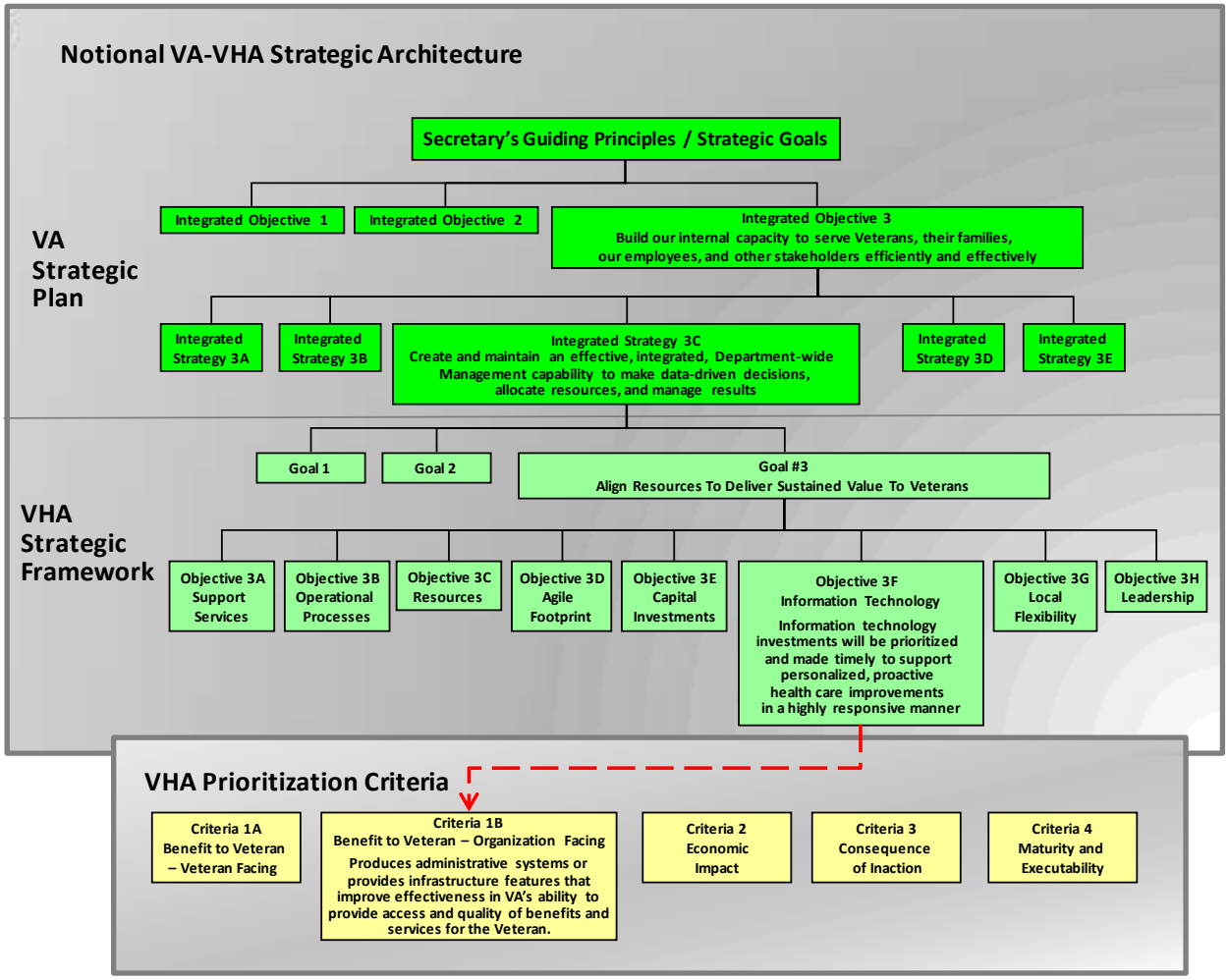

Figure 10 – Prioritization Criteria Linkage to Strategy

A.6 BUSINESS FUNCTION FRAMEWORK LINKAGE TO STRATEGY

The VHA Strategic Investment Management (SIM) organization develops and maintains the VHA Business Function Framework that represents the business functions necessary to deliver health care for communities being served by VA. The Business Function Framework identifies, elaborates and models the VHA business, providing a mechanism for linking the VHA organizations, strategies, applications, business processes, and other components in the business architecture. The Business Function Framework is an organizing construct that provides context for VHA business functions and business architecture, helping to link architecture products such as: business rules, use cases, process models, requirements, services, information models, role models, etc. The Business Function Framework drives greater collaboration, integration and information sharing with other agencies, which includes joint VA/Department of Defense interoperability initiatives. And finally, the Business Function Framework supports compliance with Department and Federal Architecture requirements.

The Business Function Framework establishes a bridge between the VHA strategy and the organization's technology resources. A notional diagram of that demonstrates linkage between the VHA Business Function Framework and the VHA Strategic Framework is depicted in Figure 11 below.

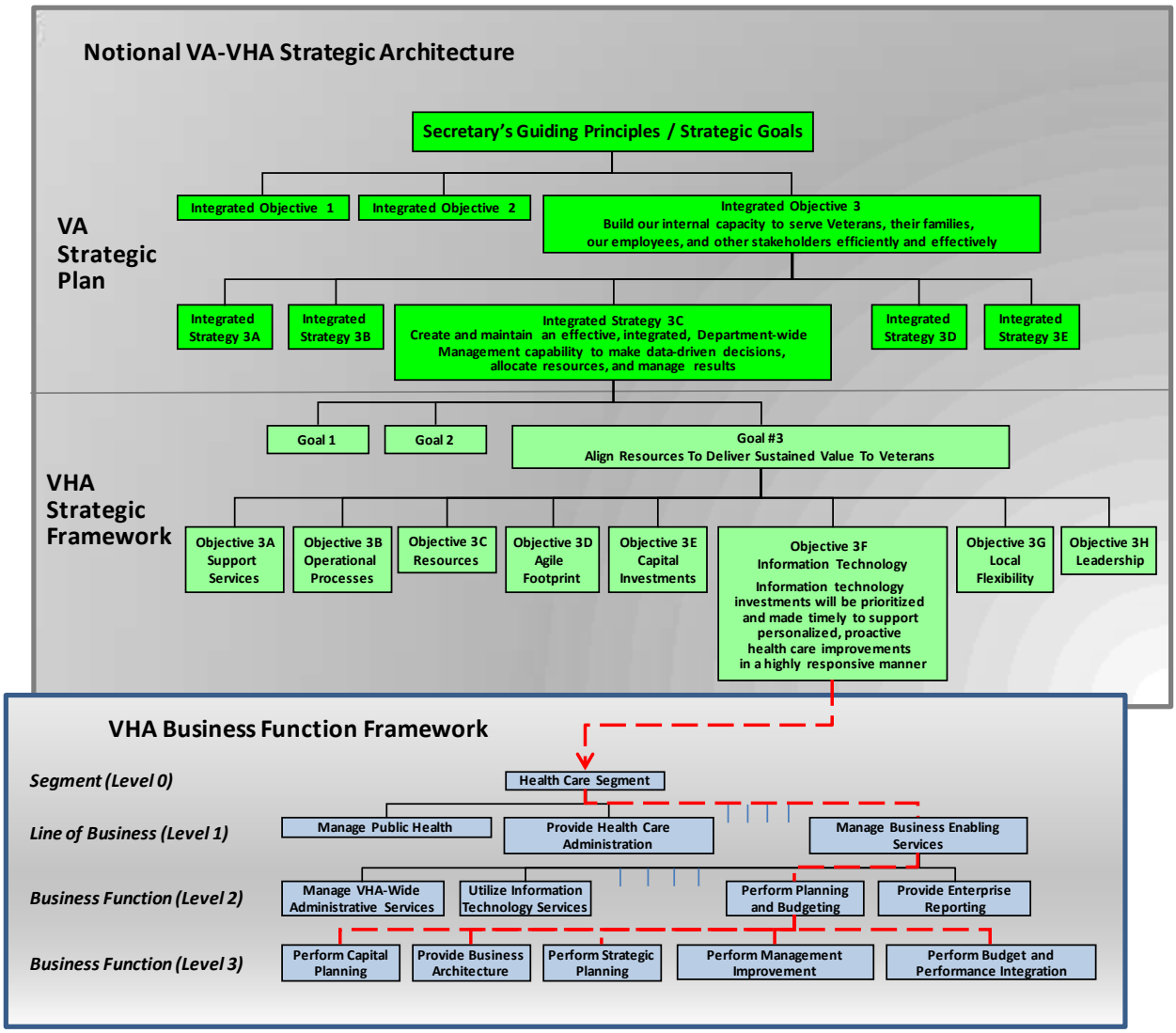

Figure 11 – Business Function Framework Linkage to Strategy

Appendix B. ADDITIONAL HEALTH INFORMATION DRIVERS

B.1 VA LEADERSHIP STATEMENTS AND POSITIONING

B.1.1 FIVE PRINCIPLES OF TRANSACTIONAL QUALITY AND MANAGEMENT

A future EHR shall also embrace the following five principles of transactional quality and management as defined by Dr. Robert Jesse, Principal Deputy Under Secretary for Health (PDUSH), at the 2010 VeHU Conference:

- Data must be acquired as an integral part of the workflow process;
- Adoption is dependent on workload burden;
- Real-time visibility into and transparency across the enterprise are required;
- Evidence-based management is needed to ensure evidence-based care; and
- Knowledge and complexity management are crucial to moving forward.

B.1.2 IT STRATEGIC THEMES

The following statements are excerpts from the EHR Architecture Summit, September 2010, attended by VHA, VA OI&T, DoD, and Indian Health Service communities to advance future strategies relative health platform (Major Initiative 16), more specifically, a strategy for a future EHR for VHA. Subsequent to VA's internal commitment to an improved health platform, VA and DoD committed "both of our departments to a single, common, joint integrated electronic health record, the IEHR"[33]. This would address "one of the most complex challenges we face … doctors having all of the information that they need in order to provide [Veterans or Service Members] the care that they deserve."[34] The vision is that VA and DoD can seamlessly access and utilize medical record information created by either department.

VHA's vision for a future state EHR requires the system shall:

- Leverage Open Source principles
- Support evidence-based management needed to ensure evidence-based care
- Be able to access patient health information from multiple care points and care settings
- Enhance organizational agility
- Support multiple VHA missions: patient care, education, research, and backup for national emergencies
- Position system as a national resource
- Enhance health IT interoperability with business partners (DoD, HHS, and private sector)
- Comply with health IT standards
- Support collaborative and transparent governance
- Facilitate internal innovation
- Enhance usability balanced with security and privacy
- Acquire data as an integral part of clinical workflow

[33] Secretary of Defense Leon E. Panetta, "Remarks by Secretary Panetta and Secretary Shinseki from the Department of Veterans Affairs", February 5, 2013, http://www.defense.gov/Transcripts/Transcript.aspx?TranscriptID=5187.

[34] ibid.

- Provide real time visibility into and transparency across the enterprise
- Be flexible and adaptable to multiple user needs
- Maintain functionality of legacy CPRS
- Integrate data from all health system resources (internal and external)
- Serve computable data in a useful format
- Be interoperable for a variety of devices
- Be ubiquitous for data entry
- Include comprehensive Continuity of Operations Plan (COOP) and fail-over capability
- Enable linkage between health outcomes and IT
- Embodies the vision of a Learning Health System
- Include context and metadata for data

B.2 STANDARDS AND INFORMATICS INSIGHTS

Standards[35] and Informatics (e.g., clinical, bioinformatics, and public health) have implications on HIT, particularly from interoperability, acquisition, and economies of scale standpoints. VHA will continue to play a significant role with Standards Development Organizations (SDO) such as Health Level 7 (HL7), American Society for Testing and Materials (ASTM), National Council for Prescription Drug Programs (NCPDP), Digital Imaging and Communications in Medicine (DICOM), International Organization for Standardization (ISO), Institute of Electrical and Electronics Engineers (IEEE), etc.—both as a consumer and contributor. Code sets and terminology standards such as ICD-10, Logical Observation Identifier Names and Codes (LOINC), and Systematic Nomenclature of Medicine Clinical Terms (SNOMED-CT) will continue to guide and influence VHA's informatics activities.

Informatics provides crosscutting support for VHA and other business partners' (e.g., DoD) goals of Health Risk Assessment, Predictive Modeling and Care Coordination/Telehealth through the use of:

- Interoperable data elements, medical terminologies, and national information health exchange practices
- Increased sophistication of clinical best practices codified in system behavior/response
- Increased focus on consumer informatics to assist both Veterans and other Health Care consumers in their ability to proactively manage and support their health and wellness needs (e.g., put clinical applications into consumer technology devices such as cell phones or improving access by providing a VA presence in social networking communities). This enhances both safety and access to health care.
- Access the rich data available in historical free-text documentation to provide highly specific and context sensitive decision support and accelerate discovery of new knowledge by researchers to be able to predict the future care that Veterans will need.

Informatics infrastructure activities that support broad VHA system support needs include:

- Maximize the semantic web in health care to bring intelligence to patient-computer and provider-computer interactions.

[35] The standards mentioned are just a brief synthesis and should not be considered all inclusive.

- Accelerate understanding of clinical system needs, use and impact in Health Care environment through the strengthening of virtual communities, amplifying the voice of the user of VHA systems.
- Improve human/machine interface to:
    - Move the time requirements for information capture off of the clinical providers.
    - Increase quality of data capture to enhance data reuse for intelligent clinical decision support and post clinical data analysis for operations, health research, population and individual discovery.
- While preserving innovation and discovery by VA staff for VA staff HIT needs, also work synergistically to standardize those elements of HIT (Medical terminologies/Health information interchange methods/health services architecture) that will provide a robust, contemporary platform from which clinicians throughout VA can innovate to continually drive the improvement of VHA systems.
- Accelerate medical device interoperability by engaging with standards groups to fast-track medical device standards and contract language to enhance patient safety through improved health information handling practices.
- Use contemporary tools to develop clinical and business processes to create excellence in health care and consumer processes then use this knowledge to made Health Care processes safer and to inform clinical and business system development to meet the needs of the VHA and the Veteran

The Federal Health Architecture (FHA), ONC HIT Policy Committee and the ONC HIT Standards Committee, DoD/VA HARB, and the Interagency Clinical Informatics Board (ICIB) will continue to guide architecture initiatives, interoperability standards adoption, clinical content, data sharing strategies, and enhance seamless access to EHR data on shared patients, separating, and separated military members.

VA DoD Interoperability Standards can be found at the following link: https://www.voa.va.gov/DocumentView.aspx?DocumentID=1089

B.3 GARTNER AND THE EHR GENERATIONS MODEL

In February, 2011 Gartner delivered a report to Dr. Paul Tibbits and Chuck Hume comparing VistA to the commercial EHR marketplace. The report concluded that VistA is "is more than a Generation 1 EHR and may in fact be a Generation 2 EHR but is not a Generation 3 EHR." This assessment provides reinforcement to the health care drivers and vision articulated elsewhere in this document. Gartner defines the Generations of an EHR as:

- **Generation 1 – "The Collector"** – Characterized as data access systems. No analytics, workflows, or clinical decision support of merit. Simply electronic (scanned) versions of the paper chart, results, and consults along with transcriptions. Not designed for "real time data entry" – it's about digitizing records.
- **Generation 2 – "The Documentor"** – Characterized as data capture systems used to document care at the point of care. Minimal workflows (order entry, routing for signatures, etc.) and clinical decision support (simple rules like drug-drug and drug allergies) are present.
- **Generation 3 – "The Helper"** – Characterized as an increase in clinical decision support and workflows along with clinical displays that are more configurable. Clinical decision support

allows users to see the pathways or guidelines, alerts can be proactive vs. reactive, provides basic cause and effect inferences. Use of a controlled medical vocabulary is required. Multiple form factors for clinical displays (web, tablet, etc.) are required. The entry point for evidence based medicine in an EHR.

- **Generation 4 – "The Colleague"** – Complete, inseparable, integration between clinical documentation, display, workflow, and clinical decision support. The EHR supports advanced visualizations of clinical data, clinical decision support is based on a complete understanding of the patient record and goals. Evidence based medicine is made much more readily accessible to the user.
- **Generation 5 – "The Mentor"** – More than a decade in the future the vision is that systems guide clinicians. The pinnacle of evidence based medicine in an EHR.

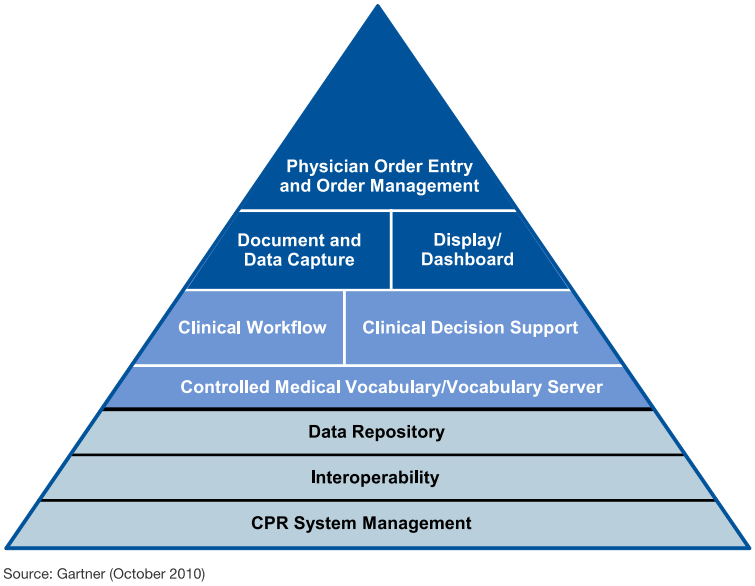

Figure 12 - The Gartner Core Capabilities of a CPR System

Over the next decade VHA will migrate toward a Generation 4 system. Some key focus areas will be:

- Facilitate Evidence Based Medicine.
- Provide easy collection, analysis, and feedback on quality and efficiency metrics.
- Easily implement regulatory requirements and details standards of care into the EHR system.
- Share workflows, decision support rules and analytics across organizations.
- Focus on workflows across all teams/providers vs. just specific roles "primary care", "surgeon", "dietician", etc.
- Deploy a user interface that "learns" how users interact with the system and facilitates that use while simultaneously "educating" users on better practices.
- Develop robust, complex dashboards enabling doing the right thing efficiently.
- Ensure complete coverage of the patient life cycle.
- Support all care venues.
- Enabling integrated scheduling (test X depends on test Y, if Y is delayed, X needs delayed).
- Providing patient access to enable telemedicine, remote entering of data, e-visits, etc.

Appendix C. VHA BUSINESS FUNCTION FRAMEWORK

The VHA Business Function Framework (BFF) is a Business Reference Model (BRM) that represents the VA business functions necessary to deliver health care. It describes the operational functions of the VHA, and is a functional model, not organizational, IT-centric, programmatic or process-oriented. The BFF provides a means to consistently categorize VHA programs and investments to support portfolio analysis, PPBE, and project prioritization. The BFF, down to the second level of decomposition, is shown in Figure 13.

The VHA BFF enables a line of sight from the VHA strategy layer, through functional operations and down to supporting VHA applications and data. The VHA BFF connects VA, VHA and other agency artifacts and products such as: VA and VHA Initiatives, VHA IT investments, Business Needs, Business Process Models, Logical Information Models, "As-Is" VistA Requirements, DoD/VA Health IT Standards, and integrated Electronic Health Record capabilities.

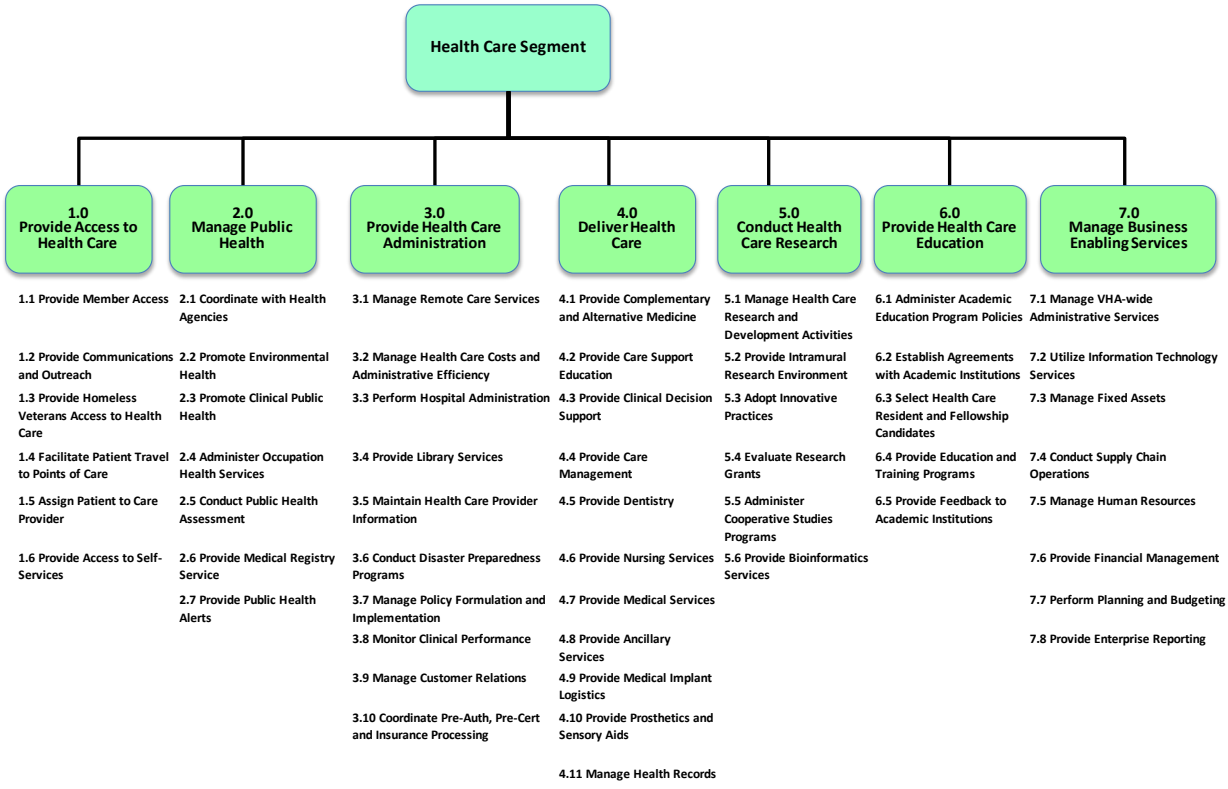

Figure 13 - VHA Business Function Framework

The VHA BFF is used to perform business analytics with a primary focus on business to IT analysis. By performing architectural mappings to show linkages between the VHA BFF and other pieces of the VHA business architecture, relationships to OneVA EA, other agencies, as well as key VHA activities and efforts; the BFF provides leadership with a tool for significant and broad organizational awareness and insight. Architectural mapping is a process that aligns two or more source artifacts by matching their components with established criteria and mapping rules. Mapping architectural components like the VHA Strategic Objectives, VHA IT Business Needs, VHA Program Inventory, VHA Applications, and VA Capabilities supports executive decision-making.