

VistA Comparison to the Commercial Electronic Health Record Marketplace

Final Report

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U.S. Department of Veterans Affairs



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Executive Summary

Objective and Approach

■ Project Objective

- The Department of Veterans Affairs (VA) engaged Gartner to develop a fact-based assessment of how VistA capabilities compare to those that are found in leading commercial off-the-shelf (COTS) Electronic Health Record (EHR) products.

■ Approach

- Gartner applied an evaluation framework which is based on Gartner research, Gartner's definition of an EHR and methodologies (e.g., Magic Quadrant, Generations Model, Hype Cycle) to compare VistA clinical functionality to that of the EHR COTS products.
- The evaluation framework compared VistA capabilities to those of COTS products in three major categories:
 - Core Clinical Capabilities
 - Support for Key Care Venues
 - Support for select Stakeholders

Key Points

- VistA delivers value through a set of core EHR functions
- VistA has more than core capabilities in some areas, but innovation and agility are increasingly difficult
- VistA core capabilities lag COTS EHR solutions
- VistA support for care venues generally lags COTS EHR solutions, but is more advanced than COTS solutions in some care venues
- VistA lags leading COTS EHR products with respect to specific stakeholder support
- The EHR COTS market is saturated, consolidating, and innovating

VistA Delivers Value Through a Set of Core EHR Functions

Value Delivered

- Notwithstanding its limitations, VistA has delivered significant benefits to VA, its providers, and care of its patients.
- Users of VistA have great confidence in the system's ability to meet their needs.
- Clinicians have built upon their long experience with VistA to develop outcomes with templates and tools to streamline their activities, capture of extensive data, and implementation of key reminders.
- VistA support for data capture and reporting allows the VA to consistently report very high conformance with critical performance measures. The data has allowed the VA to conduct extensive analytics to investigate and report on the efficacy of programs of care.
- VA clinical leadership reports that the availability of VistA supports the VA's ability to recruit and retain medical staff.

Core Functionality

- During its early years, VistA provided advanced capabilities compared to what was generally available at that time.
- Today, the COTS EHR market has overtaken VistA in terms of overall functionality.
- Gartner assessed the seven leaders in the market place against our Computer-based Patient Record (CPR) Generations model and found that all of these vendors provide a Generation 3 product.
- Based on a high level Generations Assessment, we would estimate that VistA is more than a Generation 1 EHR and may in fact be a Generation 2 EHR but is not a Generation 3 EHR.
- While the key clinician facing module, CPRS , provides a graphical user interface:
 - It is not as intuitive or easy to use as those of some leading COTS solutions, and
 - Other primary modules have a text based 'scroll and roll' interface which has a steep learning curve.

VistA Has More than Core Capabilities in Some Areas, but Innovation and Agility Are Increasingly Difficult

Capability Beyond EHR

- VistA offers a flexible toolkit for customizing the application to specific facility and provider needs.
- There is a lack of standardization and complex upgrade and release processes.
- VistA meets Gartner's definition of a megasuite product which includes:
 - Advanced Clinical Information Suite
 - Patient Access
 - Revenue Cycle Management
 - Clinical and Business Intelligence
- While VistA provides a broad product portfolio Gartner does not consider it a mature megasuite since at least some of the over 130 VistA applications lack functional depth.

Product Leadership and Direction

- VA's users and leadership continue to provide ideas to enhance VistA functionality.
- While VA has consolidated core development activities to realize increased efficiency and quality, decentralized customization and inadequate governance inhibits the VA's ability drive sustained innovation for VistA across the enterprise.
- These dynamics limit the VA's ability to rapidly identify, design, develop, and deploy advanced new features for VistA and may hamper future efforts to re-architect or develop an entirely new system.

VistA Core Capabilities Lag COTS EHR Solutions

- VistA compares favorably with COTS EHR solutions with regard to technical capabilities such as system management, data model and interoperability.
- VistA lags COTS EHR solutions with regard to key clinical functionality such as clinical decision support, clinical display, and workflow.

Core Capabilities	VistA	COTS Average	Leading COTS
System Management			
Data Model			
Interoperability			
Workflow			
Clinical Decision Support			
Clinical Documentation			
Clinical Display			
Orders Management			

	Does not meet core capabilities
	Meets core capabilities
	Exceeds core capabilities
	Meets much of the extended capabilities
	Meets all capabilities

VistA Support for Care Venues Generally Lags COTS Solutions, but Is More Advanced than COTS Solutions in Some Care Venues

- There are no care venue-specific modules in VistA. VistA has been configured to support a number of care venues.
- In those areas where the COTS vendors have focused (Med Surg, ED, OR), VistA does not compare as favorably with COTS Solutions.
- VistA's ability to provide a configured solution for the care venues where vendors have traditionally not focused as much (e.g., Long Term Care , Mental / Behavioral Health, Home Health), has allowed VistA to provide equivalent or better support.

Care Venues	VistA	COTS Average	Leading COTS
Medical / Surgical Wards			
Emergency Department			
Intensive Care Unit			
Outpatient Clinics			
Hospital Pharmacy			
Operative Environment			
Other Relevant Care Venues			

	Does not meet core capabilities
	Meets core capabilities
	Exceeds core capabilities
	Meets much of the extended capabilities
	Meets all capabilities

VistA Lags Leading COTS EHR Products with Respect to Specific Stakeholder Support

- VistA provides more support to patients than average COTS EHR products, but not as much as leading products
- It provides good support for nephrologists compared to COTS EHR products, but its support for oncologists is not as extensive as that of COTS EHR products

Stakeholders	VistA	COTS Average	Leading COTS
Patients	x	x	✓
Oncologists	x	x	✓
Nephrologists	✓	✓	✓
Obstetricians	N/A	x	✓
Pediatricians	N/A	✓	✓

✓	Provides focused support
x	Does not provide focused support

The EHR COTS Market is Saturated, Consolidating, and Innovating

- The EHR COTS market is highly saturated and is consolidating to a small number of leading vendors. To continue to experience growth, these vendors are developing “megasuities” by:
 - Broadening their product lines by seeking to expand the capability modules of their EHR systems (for example, by improving their operating room capabilities or adding specialty-specific modules such as oncology)
 - Updating or adding nonclinical capabilities (such as clinical and business intelligence, revenue cycle, or bed management).
- There is no perceived or real need to compete with other products in the market.
- While VistA certainly meets the criteria for a megasuite product in terms of breadth it does not appear to have as much depth of functionality as COTS megasuite products.
- There is no formal process for investigating or analyzing market trends in order to create a VistA product roadmap that keeps pace with COTS solutions.
- The functional gap between VistA and COTS solutions is likely to grow due the rapid pace of innovation in the commercial market.

Project Objectives and Approach

Project Objective

- The Department of Veterans Affairs (VA) engaged Gartner to develop a fact-based assessment of how VistA capabilities compare to those that are found in leading commercial off-the-shelf (COTS) Electronic Health Record (EHR) products.
- Gartner applied an evaluation framework which is based on Gartner research, Gartner's definition of an EHR and methodologies (e.g., Magic Quadrant, Generations Model, Hype Cycle) to compare VistA clinical functionality to that of the EHR COTS products.
- The evaluation framework compared VistA capabilities to those of COTS products in three major categories:
 - Core Clinical Capabilities
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Project Approach

- Gartner conducted this assessment from late December 2010 to early February 2011 according to the following six key steps:
 1. Document review
 - VA provided information regarding VistA capabilities and architecture
 - Gartner conducted research into VistA and private sector extensions of the FOIA VistA suite
 2. Questionnaire and clarification
 - VA provided responses to a structured evaluation framework
 3. Interviews
 - Gartner conducted interviews with individuals from VHA and OI&T (see list of interviewees in the Appendix)
 4. Site Visits
 - Gartner attended presentations and system demonstrations on site at VA facilities in Washington DC and Richmond VA (see list and descriptions of site visits in Appendix)
 5. Development of draft report
 - Gartner applied the evaluation framework based on Gartner research and methodologies (e.g. Magic Quadrant, Generations Model, Hype Cycle) to compare VistA's clinical functionality to that of the EHR COTS products
 6. Refinement of draft and presentation of final report

Electronic Health Record Systems Marketplace

VistA in the context of the COTS EHR Marketplace

- There are a number of considerations to keep in mind when comparing VistA to the COTS marketplace:
 - VistA has been developed and implemented in VA facilities over the last 20 years,
 - There are no new VistA implementations in any VA facilities,
 - There is no perceived or real need to compete with other products in the market place,
 - Many VA providers have worked only (or almost exclusively) in the VA system and have little experience with other EHR systems,
 - There has therefore been no overall product and release strategy for VistA and little investigation or analysis of developments in the marketplace.
- It is in this context that we provide the following discussion of the state of the EHR marketplace and highlight some relevant implications for the VA

What is an EHR?

- The U.S. government uses the term "electronic health record" (EHR) to mean any medical record system, maintained on behalf of a healthcare delivery enterprise, that is interoperable with other such systems. The U.S. media's use of "EHR" is less precise, however, and often is used to describe any system that contains individualized medical information.
- Gartner defines an EHR system as one which
 - Contains patient-centric, electronically maintained information about an individual's health status and care
 - Focuses on tasks and events directly related to patient care, and
 - Is designed for use by clinicians.
- These point-of-care solutions are not limited to bedside visits or clinic rooms but can include telemedicine and asynchronous encounters such as e-visits.
- When designed and implemented correctly, an EHR system should meet a Healthcare Delivery Organization's (HDO) clinical, legal and administrative requirements for clinical processes.
- It is important to note that administrative requirements refer to the handling of patient information and not financial administration. However, as the data in the EHR system is the foundation for billing and outcome activity, an EHR system must be able to facilitate those processes as well.
- Gartner's definition of an EHR system limits its scope to the full continuum of care within a single organization, although an HDO might choose to allow both employed and affiliated clinicians to use the system.

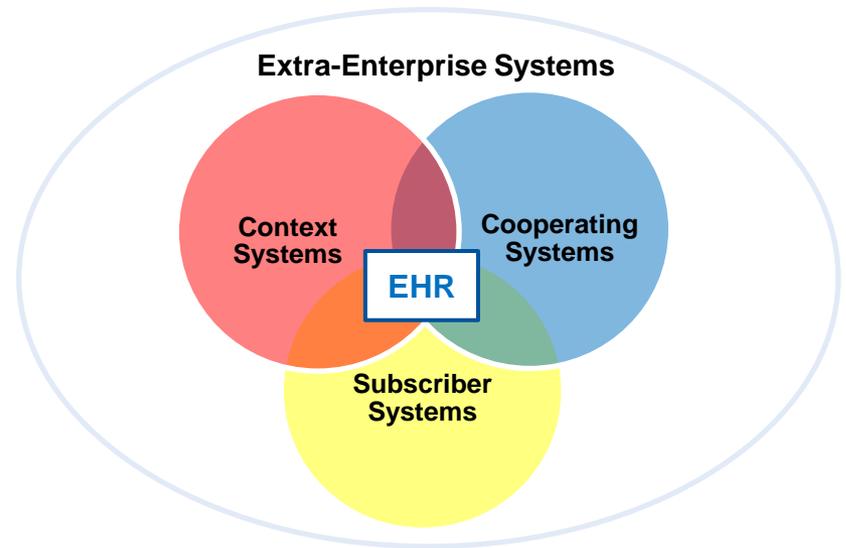
Gartner Has Identified a Number of Core Capabilities of an EHR

Core Capability	Description
Order Management (including Computerized Physician Order Entry or CPOE)	Support a variety of mechanisms for entry and management of all types of clinician orders
Clinical Documentation & Data Capture	Capture all clinically relevant information at the point of care
Clinical Display/Dashboard	Present data in a meaningful manner that contributes to the clinician's ability to use the data effectively
Clinical Workflow	Support for the processes involved in clinical care as well as the information needed
Clinical Decision Support (CDS)	Ability to incorporate rules and decisions
Data Model	Permanent data store that guarantees that information is stored for the legally required time and can be retrieved rapidly and flexibly.
Interoperability	Ability to communicate and interact with other systems
System Management	Includes support for security (while balancing the need for legitimate access), identity management, disaster recovery and business continuity.
Continuum of Care and Caregivers	Provide capabilities across the care venues: ambulatory, inpatient and pharmacy and caregivers: physicians, pharmacists, nurses, etc.

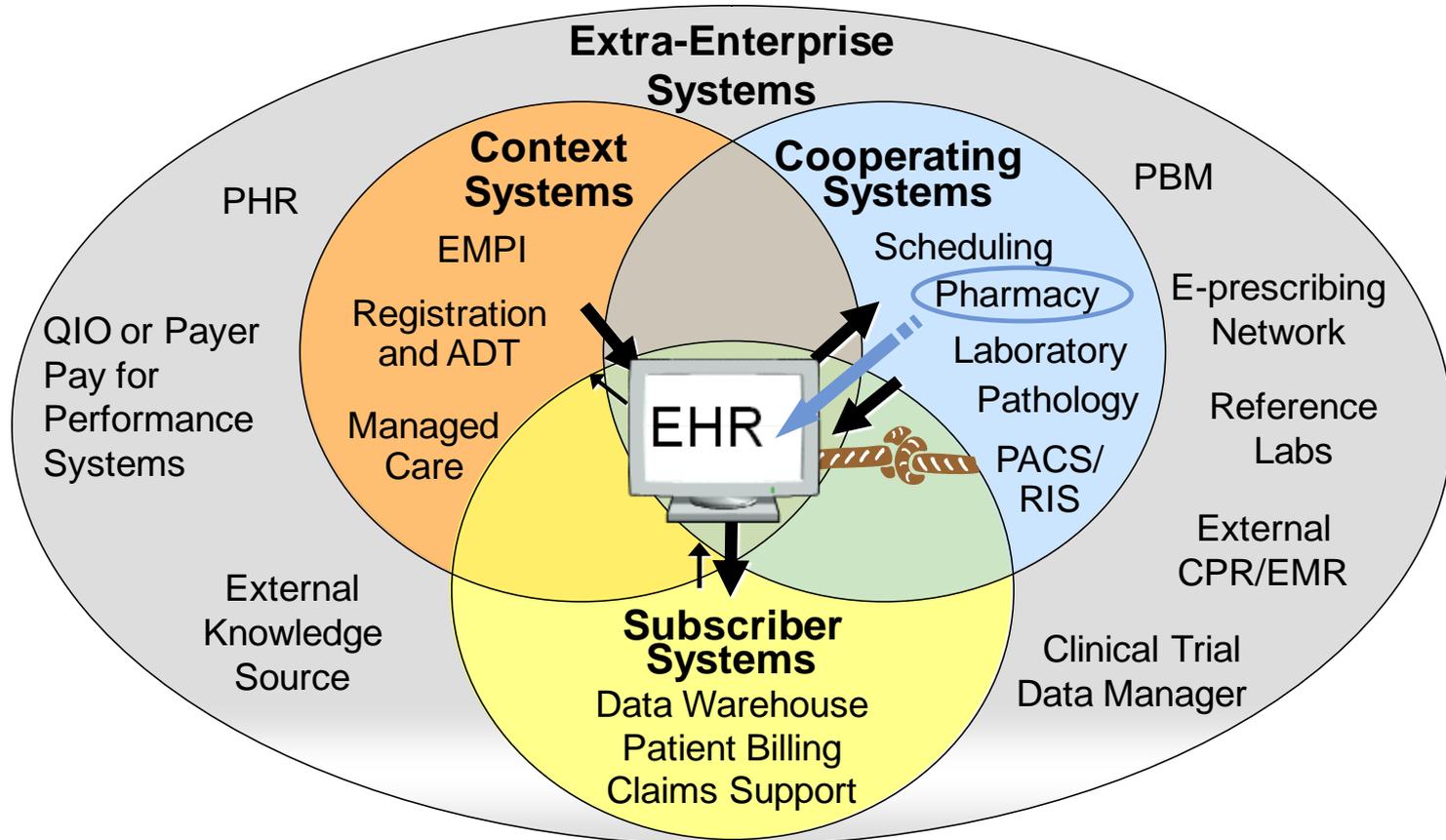
VistA provides many of the core capabilities of the EHR

The Clinical Environment – Ecosystem for Clinical Information Systems

- The Gartner definition is specific to enable comparisons across the COTS EHR market. However, Gartner realizes that a well-functioning EHR system cannot exist in isolation and requires significant interactions with a complex array of healthcare-related applications such as admission, discharge and transfer (ADT) systems, lab systems, radiology systems, and billing systems.
- Gartner categorizes these as follows:
 - **Context systems** help identify individuals and provide information that is essential for the correct management of clinical encounters. In general, these systems provide information to the EHR, but require little information from it.
 - **Cooperating systems** are point-specific solutions that interact more fully with the EHR in terms of providing and utilizing EHR data. Processes enabled by cooperating solutions may be substantial enough to support separate solutions. As EHR systems and needs mature, their functionality may become part of the integrated EHR solution
 - **Subscriber systems** require information from the EHR and other systems, but do not directly contribute significant information to them.
 - **Extra-enterprise Systems** are those solutions outside the control of the enterprise which must also share information with the EHR solution



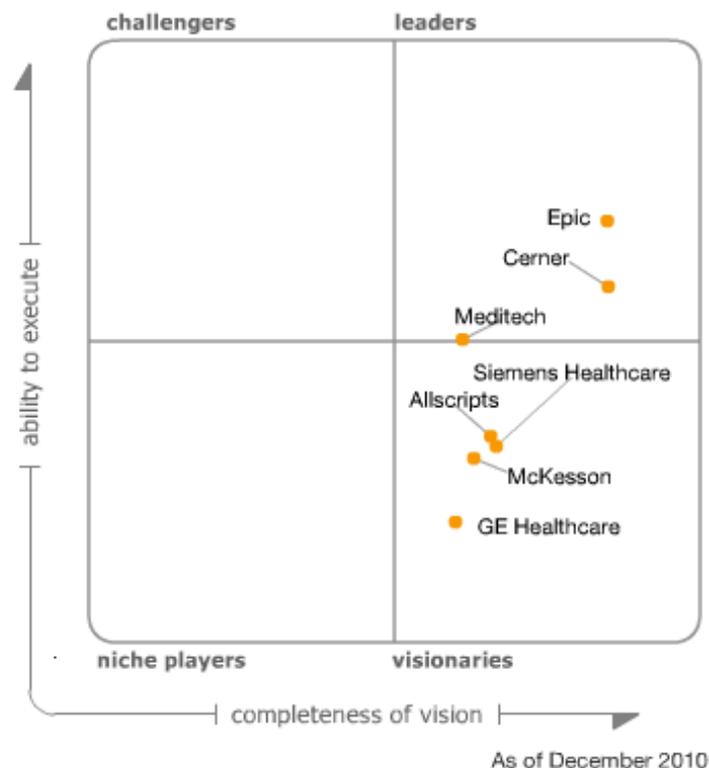
Examples of Applications in the overall Clinical System Ecosystem



Vista provides EHR capabilities, as well as the capabilities of some Context, Cooperating, Subscriber Systems, Systems which do not directly support clinical care

Market Overview

- In the U.S., most midsize to large hospitals and HDOs have already chosen and many are well along in implementing a EHR approach for their hospitals and owned physician practices.
- ARRA and stimulus dollars for use, and ultimately penalties for nonuse, are accelerating their efforts to fully implement their systems.
- However, cost, organizational readiness and willingness to commit to process change have curbed progress toward widespread full implementations among late-adopting organizations.
- There has only been modest growth in the number of U.S. HDOs that have fully implemented an EHR system.
- The data from the vendors and from Gartner clients still suggests that fewer than 20% of U.S. HDOs have fully implemented an EHR system.
- The market is consolidating to a small number of leading vendors who offer integrated approaches to inpatient and outpatient needs for HDOs.



It would be difficult for the VA to profitably compete with these key vendors, or with those organizations which have developed a market offering based on Vista

COTS Market Projection

- While the past six months have seen a number of HDOs announce that they will be changing to a new enterprise vendor, Gartner believes that the U.S. enterprise EHR system market is nearly saturated and that there will be few large sales in the next years.
- Vendors are looking outside of the U.S. for new opportunities and are turning down-market to small U.S. hospitals for new revenue growth.
- In many cases, the change is a result of factors such as a desire for a truly integrated system encompassing both inpatient and outpatient, mergers and acquisitions of hospitals, or frustration with the pace of new development.
- To continue to experience growth, vendors are
 - Seeking opportunities outside of the U.S.,
 - Broadening their product lines by seeking to expand the capability modules of their EHR systems (for example, by improving their operating room capabilities or adding specialty-specific modules such as oncology), or
 - Updating or adding nonclinical capabilities (such as their revenue cycle products or bed management).

VA has not expressed interest in competing in this consolidating market space

EHR COTS Vendors are Developing Megasuites

- HDOs are increasingly seeking to leverage health IT applications to re-engineer core clinical, administrative and financial processes, and in doing so, they often try to buy as much of their software from as few vendors as possible – Gartner refers to these as megasuites.
- The leading healthcare megasuite vendors are developing broad and deep product portfolios covering cornerstone applications, as well as supporting packages.
- Cornerstone applications include patient access (PA), revenue cycle management (RCM), business intelligence (BI) applications and computer-based patient record (CPR) systems.
- These foundational products target the primary operational and strategic concerns of the entire healthcare enterprise, and support the changing models of care delivery, especially in the greater emphasis and challenges of collaborative care.
- The megasuite vendors may also have a repertoire of other products that add value to specific departments or niche areas.

VistA has many of the attributes of a megasuite

Megasuites will mature over time to have clearly identifiable attributes

- Products rich in features and functions (see following slide)
- Products that meet the needs of acute care, primary care, outpatient clinic, mental health, long-term care, community care and home-care environments
- Companion tools and applications that supply insights to support management decision making at multiple levels — hospital, physician practice and health region.
- A development methodology and support structure that suits differing care pathways, referral patterns, healthcare delivery structures and reporting requirements.
- Leading international vendors will have development and supporting methodologies to permit them to easily deliver what is required in each geography since there will likely be significant differences in the access, delivery and accounting for care in different countries
- Mature megasuite product features and functions are described more fully in the Appendix

VistA would not be considered to be a mature megasuite

VistA Overview of Findings

VistA Overview of Findings – Functions and Features

- During its early years, VistA provided advanced capabilities compared to what was generally available at that time.
- However, at this time the COTS EHR market has overtaken VistA in terms of overall functionality and it would not be considered a leading edge product compared to today's readily available leading COTS EHR products.
- Gartner has assessed the seven leaders in the market place against our CPR Generations model, and we find that all of these vendors provide a Generation 3 product.
- While Gartner did not complete a formal Generations Assessment of VistA, we estimate that VistA is definitely more than a Generation 1 EHR and may in fact be Generation 2 EHR, but is definitely not a Generation 3 EHR.
- One of the key determinants of this assessment is that while VistA has very successfully automated the patient record, and the VA has all but eliminated any hard copy patient records, the system provides little in the way of checks and balances which prevent clinicians from making inadvertent mistakes.

VistA Overview of Findings – Functions and Features (continued)

- VistA offers a flexible toolkit to the VAMCs for customizing the applications to their geographic, regulatory, or patient needs.
- This provides significant value in the ability to meet local needs at a facility level, however this also leads to a lack of standardization across the enterprise and makes for a complex and cumbersome upgrade and release process.
- CPRS has a GUI front end which makes it easier for the clinicians to complete documentation. However, the system has lost some of the functionality during its conversion from the 'scroll and roll' format.
- The primary modules, with the exception of CPRS, have the 'scroll and roll' interface. This appears not to be a serious issue with the existing experienced and super-users but can present a considerable steep learning curve for the new users of the system since the non-GUI interface is not intuitive.

VistA Overview of Findings – Capabilities beyond that of an EHR

- VistA meets Gartner’s definition of a megasuite product which provides integrated capabilities which are designed to work together, built by a common engineering team using a common application infrastructure and based on a common database schema
 - Megasuite solutions comprise with a broad product portfolio covering core EHR applications as well as numerous applications that provide supporting functionality.
 - VistA is comprised of a large number of applications, over half of which would not be considered part of an EHR and have not been assessed here (see the Appendix for a complete description of VistA applications and how they are classified in the Gartner Advanced Clinical Information System model).
 - VistA, like other megasuites, provides capabilities in at least the following areas:
 - Advanced Clinical Information Suite (which includes EHR and departmental applications)
 - Patient Access
 - Revenue Cycle Management
 - Clinical and Business Intelligence
 - While VistA provides a broad product portfolio covering cornerstone applications as well as supporting packages, we would not consider it a mature megasuite since at least some of the over 130 applications making up VistA lack depth in the functionality they provide to the user
-

VistA Overall Findings – Value Delivered

- Notwithstanding its limitations, VistA has delivered significant benefits to the VA, its providers, and its patients.
- Users of VistA have great confidence in the system's ability to meet their needs.
- Clinicians have built upon their long experience with the solution to develop remarkable outcomes with templates and tools to streamline their activities, capture of extensive data, and implementation of key reminders.
- However, there does not appear to be a formal structured process for sharing these best practices across the facilities (or even among clinicians within a facility).
- The ability to consistently capture data and report on it allows the VA to consistently report very high conformance with Critical Performance Measures (such as those required by the Joint Commission).
- The data has allowed the VA to conduct extensive analytics to investigate and report on the efficacy of programs of care.
- Clinical leadership reports that the availability of VistA supports the VA's ability to recruit and retain medical staff .
- However, most clinicians interviewed had little experience with other EHR solutions and could not compare what they were using to what is generally available in COTS EHR solutions.

VistA Overall Findings – Governance and Direction

- VA has been working on VistA for over 20 years and the solution is widely deployed.
- Given that, the VA is not implementing the product in net new environments, it is largely being incrementally enhanced.
- As such it does not have a number of key components of COTS products such as processes and tool kits for deployment; and organizational structures and processes develop and deploy a structured long term product release strategy (e.g. market research, user groups, governance processes).
- VA's users and leadership have been visionary and provided a number of ideas to enhance VistA's functionality, however the absence of an overall governance body has hampered widespread deployment of enhancements across facilities and among care domains.
- The VA history of decentralized development and informal governance over the development and product release strategy currently reduces speed to market – the ability to rapidly identify, design, develop, and deploy new features.
- The same can be said for future efforts to re-architect and develop an entirely new system, even strong COTS vendors who had significant financial resources and strong development capabilities have had challenges in developing and deploying new generations of their solutions (e.g. Cerner's move from Classic to Millennium was more than 5 years before the market felt that it was ready, and Siemens' Soarian is only now just “good enough” and it has been at least 6 years in the making).

VistA Overall Findings – Technical Architecture, Development and Deployment

- VistA is a collection of over 130 core EHR and related applications. However, VistA does not appear to be architected as an underlying platform with applications that plug in via well defined and stable APIs.
- Integration of COTS products or code developed elsewhere into VistA has proven to be difficult, if not impossible, due to the need for heavy customization.
- Despite processes for collecting and prioritizing requirements, there is a lack of a coherent long-term product roadmap that lays out the major functional enhancements and timelines.
- VA has begun to use Integrated Project Teams to develop requirements. However, these teams are weighted towards IT and are VA-centric and do not necessarily incorporate extended functionality available in the market.
- The grass roots development of applications through the partnership of programmers and clinicians was key to the early success for VistA.
- OI&T has consolidated all development activities to provide efficiencies and quality using formal processes and has implemented a repository for project management. However, this centralized planning approach has potentially come at the cost of the innovation and agility.
- Given this, the functional gap between VistA and COTS EHR products may actually get wider over time.
- Since facilities can customize and configure their instances of VistA and there is no centralized configuration management or source code management system, it is difficult to ensure that rigorous and complete regression testing occurs for new releases
- There have been no new applications deployed for several years and as a result the roles and responsibilities for deployment are only beginning to be defined.
- OI&T approaches deployment primarily as a software installation issue, leading COTS vendors are developing formal approaches and tools to supporting organizational, operational and process changes that must be implemented as new applications are deployed.

VistA Capability Assessment

Core Capabilities

Core Capabilities

System Management

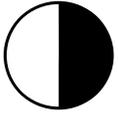


Capabilities

- VistA functionality supports configuration management for the multiple applications that comprise the VistA systems.
- VistA is able to maintain system parameters, manage master data, and coordinate interfaces. Through the tools of the underlying operating system and the VistA management tools contained in the Kernel suite, system parameters can be effectively managed and monitored.
- VistA manages identity access and is able to provision, enforce, and track user identities and identities within roles. Single sign-on capability and patient smart card identification are also key capabilities.
- Business continuity and disaster recovery plans seem to be well defined and work well (as evidenced by disaster recovery in the wake of Katrina).
- Although the consistency of the planning appears variable across the full spectrum of VistA systems and applications.

Gaps

- Fully implementing the existing VistA audit capabilities appears to lead to significant system response time degradation. Therefore, although auditing capability exists, it appears to be inconsistently implemented across facilities
- VistA Content Management tools to support versioning of reference data, processing logic, and business rules appear to be minimal.
- VistA does version mandatory code sets (for example CPT codes), but versioning is done only where mandated.



Capabilities

- The data model structure can organize and manipulate a mixture of fine-grained clinical information and text.
- The data model includes the ability to store problems, medications and lab tests using standard codification sets (e.g., LOINC).
- VistA prevents clinical data once entered to be deleted, it can be annotated or amended, but not deleted or changed. The data is also tagged with who entered or annotated the information and when (but not when the data originates from an external source).
- The data model is able to store information about a patient's condition.
- The data structures support the ability to describe the organizational units of the HDOs on many levels without comingling the administrative data.

Gaps

- Clinical care timestamps are not captured independent of facility time zones or seasonal adjustments. For example, transfers between treatment locations and during daylight savings time adjustments may result in confused patient treatment chronologies. This is a patient risk issue.
- There was no evidence that the data model has a semantic network of clinical concepts to support categorical reasoning during clinical care. This limits Vista's ability to provide clinical decision support.
- The VistA data model does not support decision maps or workflow graphs for complex decision making.
- The data model is limited in its ability to support data being created for an effective date that is different than the current date and the ability to interpret the clinical concepts accordingly (e.g., per the code standards effective at one or the other time).
- The data model does not store classes of concepts that represent events during the course of patient care.



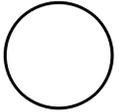
Capabilities

- VistA's more than 130 applications are fully integrated, in part through the use of a single database, and through the use of HL7 messaging to exchange data within VistA applications as well as with many national VA registries
- The VA collects information on medications and drug allergies from each facility and collects it in a central location (Austin, Texas) where it is combined with similar information from Department of Defense (DoD) facilities.
- The VA's ability to use this data in order to perform drug-drug and drug-allergy checking across organizational boundaries puts it ahead of other health systems.

Gaps

- Gartner defines interoperability as the ability to communicate with, exchange data, and interact with other, third-party, systems
 - VistA is an integrated product and therefore has not had much need to interface with disparate products and external systems
 - Some of the interoperability capabilities that VistA lacks are:
 - Accept computer-processable data from third party admitting, registration and scheduling systems.
 - Accept and store structured data from external lab information systems, pharmacy systems and ePrescribing networks.
 - Send computer-processable orders to external systems
 - Sends prescriptions as structured data to external systems

Core Capabilities Workflow



Capabilities

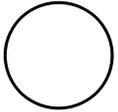
- Limited workflow capabilities can be configured through the use of order sets and reminders.

Gaps

- There are no tools to (graphic or otherwise) to define or manage automated workflow logic.
- VistA does not appear to support multi-step clinical workflow.
 - Users can not be led from one action to the next based on the clinical context.
 - Actions or prompts for subsequent care providers in the chain of care cannot be automatically created based on the outcomes of prior activities or outcomes.
- There does not seem to be a way to implement formal clinical pathways or guidelines within VistA.

Core Capabilities

Clinical Decision Support



Capabilities

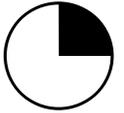
- VistA provides alerts for drug-drug, drug-allergy, and health maintenance reminders, however the VA is only now conducting a pilot to provide dosage alerts.
- While VistA clinical decision support can operate in a real-time and near-real-time manner, it does not appear to provide feedback at the earliest possible time
- VistA provides a reminder system which users can configure to remind them to conduct health maintenance activities such as vaccinations, screening tests (mammography and colonoscopy), and chronic disease management best practices.
- There are a number of alerts and order checks which are hard coded and are distributed nationally in the national VistA distribution
- In addition decision support is provided through the creation of configurable documentation templates and order sets
- However these are largely a passive form of decision support rather than an active form which pushes alerts and enforces checks and action based on relevant data and events via is through creation of order sets and documentation templates is available

Gaps

- VistA relies on a well-informed, proactive user to actively review reminders for clinical decision support.
- Reference material can be provided to the user but only upon active outreach to gather the information.
- While the Reminders capability allows the creation of rules based on clinically relevant data:
 - These are constrained to the reminders
 - VistA does not appear to have a rules engine with the capability for users to graphically create and portray rules, to provide rule management such as inheritance, reuse, distribution and use, or to support third party content
 - The output of one rule cannot activate subsequent sets of rules
 - There is no ability to create time-based alerts or orders
- The system does not seem to be able to prompt for consideration of, or enforce cessation of, a contra-indicated clinical decision.
- VistA requires clinicians to be logged into the system in order to see clinical decision support alerts and reminders and does not support notification options such as paging or e-mail.

Core Capabilities

Clinical Documentation



Capabilities

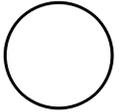
- VistA provides a tool to create highly configurable templates for clinical documentation by a range of care providers in a range of care settings however without flow sheets it does not meet the documentation needs of the ICU.
- VistA provides an electronic repository for patient clinical documentation.
- VistA provides a wide variety of input mechanisms including pick-lists, limited templates, transcription, etc.

Gaps

- VistA provides limited support for inter-disciplinary documentation.
- VistA does not provide for flow sheet documentation.
- Documentation is centered on discrete episodes and users must proactively retrieve previous documentation to be informed.
- VistA appears to only permit limited collection of discrete data elements. Most of the data collected is entered as unstructured text.

Core Capabilities

Clinical Display



Capabilities

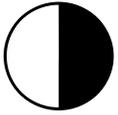
- The VistA software has a graphing feature, which allows users to view clinically relevant information in time ordered fashion and to compare multiple data series in overlaid or stacked displays.
- One of the early strengths of what was to become the VistA system was its ability to display a wide range of graphic elements (from PACS studies, to active ultrasound recordings and EKG traces, through to static documents such as scanned documents and photographs for wound care).

Gaps

- Limited ability to configure display screens to specific roles or purposes
 - Different views are not presented based on clinician role or care venue
 - Data is presented in the same way that it is entered, there is little ability to provide customized or summary views of clinical documentation
 - Little support for provider specific patient summary views
- Role, care venue, or other purpose specific information is most often provided in the form of reports.
- Limited capability to create and display an integrated longitudinal picture.
- There is some implementation of guided navigation within CPRS, but this is only narrowly available in CPRS and is not available at all in other component
- Other than a current custom built solution for displaying EKGs on Blackberry devices, there is no form factor awareness to make effective use of handheld devices

Core Capabilities

Orders Management



Capabilities

- CPRS provides order management support for the inpatient and outpatient ordering processes.
- Physicians can directly enter all types of orders including medication and non-medication (e.g. diagnostic procedures , lab test and consult requests).
- Ward clerks or nurses can transcribe a physician written or verbal orders and then send them to an ancillary department (e.g. pharmacy, lab, radiology)
- VistA provides a tightly integrated hospital pharmacy order management capability.
- VistA provides dispensing of medication using bar-coding technology

Gaps

- VistA in some cases, lacks context awareness to alert the physician when an order is contra-indicated.
- Order sets do not provide the capability for inheritance; orders are not linked together to facilitate flow or a complete view of the order.
- While it is possible to leverage order sets which were created by other VA facilities, externally provided order sets often need significant work to configure them for reuse.
- VistA is not able to create orders automatically as a part of care management protocols.
- Although ad hoc reporting and queries to support Order Management does exist (for example show all patients with unsigned verbal orders, which of my patients have medications set to expire within 24 hours, find all active orders and order sets that contain specific elements), this functionality is not generally available to clinicians for use on demand

VistA Capability Assessment

Care Venues

Care Venues

Medical Surgical Wards



Capabilities

- The VistA Medical and Surgical modules are a well defined dedicated integrated solution for medical and surgical care, however, the application is inconsistently deployed across the facilities.
- Medical and surgical patient care functionality seems to meet the needs of the users.
- VistA results reporting includes structured data captured during consults, unstructured notes captured using the Text Integration Utility (TIU) scanned documents, and automatically captured results such as labs and some data captured from devices.
- VistA has been developed to capture all clinically relevant information at the point of care. Documentation templates are available for nurses, physicians, and the ancillary services.
- VistA provides CPOE and eMAR (electronic medication administration record) specifically configured to support this care venue.

Gaps

- There is little support for interdisciplinary documentation.
- Implementation of clinical decision support for this care venue is limited in VistA.
- While there is the ability to hard code alerts and to create reminders, there is no knowledge based automated 'push' of information to help clinicians make good quality care decisions (or prevent them from making bad ones).
- There is no implementation of automated decision maps, workflow logic or rules engine utilities.

Care Venues

Emergency Department



Capabilities

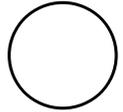
- The VA reports that an Emergency Department Information System (EDIS) has been developed and is being rolled out in a number of facilities.
- This will be a separate module which will be interfaced to VistA using CCOW tools and protocols.
- The EDIS was not made available to the Gartner review team.
- In most facilities a general set of capabilities is provided in the ED,
- These capabilities have been configured from the base set of VistA tools and templates and provide only limited ED specific support
 - VistA results reporting includes structured data captured during consults, unstructured notes captured using the Text Integration Utility (TIU) scanned documents, and automatically captured results such as labs and some data captured from devices.
 - VistA has been developed to capture all clinically relevant information at the point of care. Documentation templates are available for nurses, physicians, and the ancillary services.
 - VistA provides CPOE and eMAR (electronic medication administration record) specifically configured to support this care venue.
 - VA has leverage VistA's flexible configuration capability to provide support for ED Triage.activities
 - There is implementation of CPOE and eMAR (electronic medication administration record).

Gaps

- There was no dedicated integrated solution for the ED (although there were reports of an emerging EDIS)
- Some ED specific capabilities are limited or not available, for example
 - Tracking boards,
 - Flow sheets,
 - Automated tools for follow up care,
 - Discharge instructions, and
 - Patient education
 - Device integration
- Implementation of clinical decision support for the ED is limited.
- While there is the ability to hard code alerts and to create reminders, there is no knowledge based automated 'push' of information to help clinicians make good quality care decisions (or prevent them from making bad ones).
- There is no implementation of automated decision maps, workflow logic or rules engine utilities.

Care Venues

Intensive Care Unit



Capabilities

- In most VA facilities, VistA has been configured to provide a general set of capabilities in the ICU
- These capabilities have been configured from the base set of VistA tools and templates and provide only limited ICU specific support
 - VistA results reporting includes structured data captured during consults, unstructured notes captured using the Text Integration Utility (TIU) scanned documents, and automatically captured results such as labs and some data captured from devices.
 - VistA provides CPOE and eMAR (electronic medication administration record) specifically configured to support this care venue. including the use of a Med Order Button (or “Hot Button”) on the Bar Code Medication Administration (BCMA) tool bar to streamline the workflow in the ICU.

Gaps

- There is no dedicated integrated solution for the ICU.
- ICU flow sheets remain paper based and interdisciplinary documentation is not available
- No implementation of acuity calculators.
- While CPOE allows for the ordering of medications, there is no way to manage complex drips.
- Integration with devices is limited
- Documentation includes transcribed and scanned records.
- Implementation of clinical decision support is limited in VistA. While there is the ability to hard code alerts and to create reminders, there is no knowledge based automated ‘push’ of information to help clinicians make good quality care decisions (or prevent them from making bad ones).
- There is no implementation of automated decision maps, workflow logic or rules engine utilities. No ability to track a patient against an expected course based on diagnosis,

Care Venues

Outpatient/Ambulatory Clinics



Capabilities

- VistA results reporting includes consults, lab, TIU as well as scanned documents.
- VistA has been developed to capture all clinically relevant information at the point of care.
- ePrescribing, eOrdering(e.g for lab and radiology tests) and eMAR (electronic medication administration record) are all available in VistA.
- My HealhtyVet is a good start at a patient portal and while it is ahead of some leading vendors who lack a patient portal feature, functionality is limited (no scheduling, doesn't support e-visit, limited messaging, etc.) and lags behinds those vendors who have developed patient portals.

Gaps

- The VistA outpatient/ambulatory module is not a dedicated integrated solution.
- Implementation of clinical decision support is limited in VistA. While there is the ability to hard code alerts and to create reminders, there is no knowledge based automated 'push' of information to help clinicians make good quality care decisions (or prevent them from making bad ones).
- There is no implementation of automated decision maps, workflow logic or rules engine utilities.
- Tools that allow patient self documentation (e.g entering chief complaint for visit, family history, or review of systems) are not available in VistA.



Capabilities

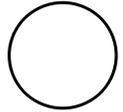
- The Pharmacy module is a dedicated integrated solution for inpatient care and outpatients. The inpatient module is integrated with over 25 other VistA applications and interacts with the Computerized Patient Record System (CPRS) and the Bar Code Medication Administration (BCMA) packages.
- The Pharmacy Application suite provides documentation for all medication orders. The Inpatient Medications package integrates functions from the Intravenous (IV) and Unit Dose (UD) modules to provide a comprehensive record of medications utilized during hospitalization of the veteran. The outpatient pharmacy maintains patient profiles and medication history.
- The VistA pharmacy software has interfaces to Pharmacy robots, medicine cabinets and automated dispensing systems.

Gaps

- Implementation of clinical decision support is limited. The system will not prevent the user from making a mistake/creating a bad order.
- There is little or no time-sensitive ordering capability. Comments fields are utilized to enter the rules around the dispensing – the pharmacist and providers who are doing administration and reconciliation need to read, understand, and act on them, and they do not allow for computable decision support or analysis

Care Venues

Operative Environment



Capabilities

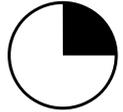
- In most VA facilities, VistA has been configured to provide a general set of capabilities in the ICU
- These capabilities have been configured from the base set of VistA tools and templates and provide only limited ICU specific support
 - VistA results reporting includes structured data captured during consults, unstructured notes captured using the Text Integration Utility (TIU) scanned documents, and automatically captured results such as labs and some data captured from devices.
 - VistA has been configured to allow for documentation of the Nurse Intraoperative Report and Operation Report.
 - VistA provides CPOE and eMAR (electronic medication administration record) but not for the intraoperative time frame.

Gaps

- Anesthesiologists still document on paper. VistA does not support the documentation of changes in anesthesia type (i.e., from general to local).
- It is not a complete solution for the OR, nor is it a dedicated integrated solution.
- There is no integration of OR and recovery area instruments.
- The graphical anesthesia record is manually scanned in.
- Implementation of clinical decision support is limited in VistA.
- There is no implementation of automated decision maps, workflow logic or rules engine utilities.

Care Venues

Other Care Venues (Long Term Care, Skilled Nursing/Rehabilitation, Inpatient Mental/Behavioral Health, Outpatient/Community/Behavioral Health, Home Health)



Capabilities

- VistA is a highly configurable system and has been developed to provide support for these care venues.
- Leverages the CPOE, eMAR, results reporting and documentation features of VistA core applications.
- Treatment plans and evaluation tools have been developed for a number of areas including drug , alcohol and mental health.
- VistA is ahead of some COTs vendors as most do not include dedicated solutions in these areas.
- VistA is better than most COTS vendors for Behavioral Health support including the ability to document group therapy.

Gaps

- Gaps that are prevalent across the other modules exist within these specialized modules as well.
- Missing workflow, decision support, and some care venue specific requirements such as multidisciplinary notes.

VistA Capability Assessment

Select Stakeholders

Select Stakeholders

Stakeholder	Capability Demonstrated by VistA	Comments
Patients	X	<ul style="list-style-type: none"> My HealtheVet is a good start at a patient portal and while it is ahead of many vendors who lack a patient portal feature, functionality is limited (no scheduling, doesn't support e-visit, limited messaging, limited viewing of clinical data etc.) and lags behind leading vendors who have developed patient portals.
Oncologists	X	<ul style="list-style-type: none"> Oncologists have several unique needs that cannot be met by configuring core EHR functionality. VistA does not have the capability of tracking life time chemotherapy dosages or radiation exposure. It also appears to only provide limited support for automating complex therapeutic protocols. Leading vendors have developed specific packages to support medical oncologists that meet their needs and are also configurable as necessary.
Nephrologists	✓	<ul style="list-style-type: none"> Nephrologists have a unique needs such as tracking the patient dialysis needs, complex lab finding and requirements for specialized medication regimes. VistA appears to be able to be adapted to meet these requirements as do average cots vendors.

Select Stakeholders (continued)

Stakeholder	Capability Demonstrated by VistA	Comments
Pediatrician	N/A	<ul style="list-style-type: none">• Currently VA does not deal with this population
OB/GYN	N/A	<ul style="list-style-type: none">• Currently VA does not deal with this population but will have to address it in the future due to an increasing population of female veterans

Appendix

Subject Matter Experts Interviewed

Interviewees

Name	Organization/Title
Catherine Pfeil	OI&T/Product Development, Director, Application Development Competency Division
Michael Braithwaite	OI&T/Product Development, Manager, Target Programming Team 1
Michael Montali	OI&T/Product Development, Manager, VistA Programming Team 1
Maureen Hoye	OI&T/Product Development, Manager, VistA Programming Team 2
Keith Cox	OI&T/Product Development, Senior Technical Analyst
Kenny Condie	OI&T/Product Development, Project Manager, CPRS v28 Project
Anthony Puleo	OI&T/Product Development, Senior Developer, Target Programming
Patrick Reddington	OI&T/Product Development, Senior Developer, Target Programming
Vanessa Davis	OI&T/Product Development, Director, Health Product Support, Management Systems
Vitalia Devlin	OI&T/Product Development, Team Leader, Clinical Team 3
Jordana Landsman	OI&T/Product Development, Management Analyst, Application Development Competency Division
Sheryl Jackson	OI&T/Product Development, Senior Product Support Specialist, Management Systems
Marggie Randall	OI&T, Enterprise Architecture Service (Set up DisGover space)
Larry Schlang	OI&T, DisGover.com (Set up DisGover space)
Kelli Montali	OI&T, Enterprise Architecture Service
David Gliewe	OI&T, Enterprise Architecture Service

VAMC Site Visits

Site Visited	VA Host Team
<p>Washington DC Veterans Affairs Medical Center (DCVAMC) is a tertiary care facility, DCVAMC provides acute general and specialized services in medicine, surgery, neurology, psychiatry, dentistry and numerous other subspecialties.</p>	<ul style="list-style-type: none">• Dr. Ross Fletcher, Chief of Staff• Marcia Insley, VHA Office of Health Information
<p>The Hunter Holmes McGuire VA Medical Center, located in Richmond, Virginia, is a 399-bed facility offering primary, secondary, and tertiary health care in medicine, surgery, neurology, rehabilitation medicine, intermediate care, acute and sustaining spinal cord injury, skilled nursing home care, and palliative care.</p>	<ul style="list-style-type: none">• Dr. Gianola, Chief of Health Informatics• Tom Fagan, CPRS Supervisor• Linda Fischetti, VHA Informatics

Appendix

Mature Megasuite product features and functions

Mature Megasuite product features and functions

■ **Clinical Product Suite**

- Fully integrated systems that provide real-time support for the practice of evidence-based medicine at the point of care
- Integrated systems providing comprehensive support for the tasks directly related to the provision of medical care, as well as promoting wellness for individuals across the entire healthcare continuum within a single healthcare enterprise
- At least a Generation 3 CPR system fully installed in a minimum of three sites in each target market or close to reaching Generation 4 criteria

■ **Clinical Information, Not Just Clinical Data**

- Support more-proactive, coordinated and personalized care through the intelligent presentation of clinical information rather than clinical data. Clinical decision support includes support for diagnosis, as well as treat

■ **More-Intuitive Usability and Visual Design**

- Leading vendors will have large groups of employees dedicated to working with developers to ensure that systems are intuitive and designed to facilitate clinician workflows

■ **Coverage of the Continuum of Care**

- Full coverage of the continuum of care — acute care (including medical/surgical wards, intensive care units, the emergency department, pharmacy, labor and delivery suites, and the operating rooms), primary care, outpatient clinics, mental health, long-term care, community care, and home-care environments.
- Product suites which are truly integrated, and not interfaced, but designed to permit modular implementation in care venues

Mature Megasuite product features and functions (continued)

■ Collaboration Capability

- Collaboration among clinicians within a single organization and between organizations.

■ Clinical Product Portfolio to Include Departmental Applications

- Broad portfolio of clinical products, including major departmental applications such as radiology, laboratory and anatomic pathology.

■ Patient-Focused Capabilities

- Patient-facing software such as patient portals (including lab and imaging results, e-visits, scheduling and patient education), mobility applications, and smart rooms and other in-hospital patient experiences will be the norm for leading vendors.
- Leading products will track care pathways over time across the care venues included in the integrated implementation, and alert proactively to ensure that the patient is being treated and managed appropriately.

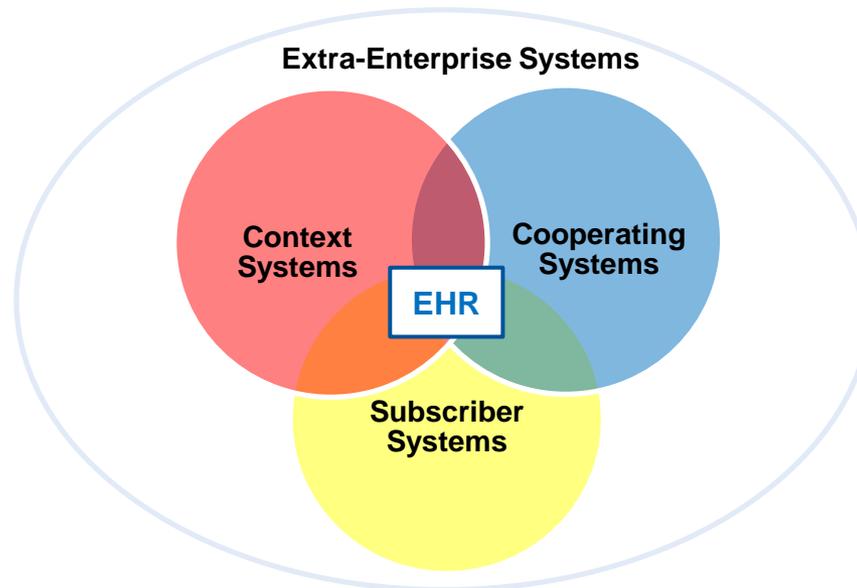
Appendix

VistA Ecosystem for Clinical Information Systems

The Clinical Environment – Ecosystem for Clinical Information Systems

VistA Specific

- VistA is a Megasuite System with a broad product portfolio covering core EHR applications as well as many applications that provide supporting functionality.
- The following pages show how the various applications and components which make up VistA can be classified into “subscriber”, “cooperating”, or “context” systems.



The Clinical Environment – Ecosystem for Clinical Information Systems

VistA Context Systems

Context Systems Definition

These VistA Context systems are not considered part of the core EHR system. They help identify individuals and provide information that is essential for the correct management of clinical encounters. In general, these systems provide information to the EMR, but require little information from it.

VistA Context Systems

- | | |
|---|--|
| <ul style="list-style-type: none">• Admission, Discharge, Transfer Registration• Patient Representative• Voluntary Service System (VSS)• Nutrition and Food Service (N&FS)• Oncology Registry• Social Work• Diagnostic Related Group (DRG) Groupers• Event Capture | <ul style="list-style-type: none">• Incomplete Records Tracking (IRT)• Integrated Patient Funds• Record Tracking• Identity Management Program• Common Service/Identity Management Service (CS/IdMS)• Master Patient Index/Patient Demographics (MPI/PD) |
|---|--|

The Clinical Environment – Ecosystem for Clinical Information Systems

VistA Context Systems

Cooperating Systems Definition

These VistA Cooperating systems are not considered part of the core EHR system. They are point-specific solutions that interact more fully with the EMR in terms of providing and utilizing EMR data. Processes enabled by cooperating solutions may be substantial enough to support separate solutions. As EMR systems and needs mature, their functionality may become part of the integrated EMR solution.

VistA Cooperating Systems

- Laboratory (4 systems)
- Pharmacy: (10 systems)
- Prosthetics
- Radiology/Nuclear Medicine
- Remote Order Entry System (ROES) for DME
- VistA Imaging: Core Infrastructure
- VistA Imaging: Filmless Radiology
- VistA Imaging: Telemedicine
- Nutrition and Food Service (N&FS)
- Oncology
- Social Work
- Document and Ancillary Imaging
- Dentistry
- Quality Audiology and Speech Analysis
- Scheduling
- Network Health Exchange

The Clinical Environment – Ecosystem for Clinical Information Systems

VistA Context Systems

Subscriber Systems

These VistA Subscriber systems are not considered part of the core EHR system. Subscriber systems require information from the EMR and other systems, but do not directly contribute significant information to them.

VistA Subscriber Systems

- | | |
|---|--|
| <ul style="list-style-type: none">• Compensation and Pension Records Interchange (CAPRI)• Enrollment Application System (EAS)• Hospital Inquiry (HINQ)• Income Verification Match (IVM)• Pharmacy: Electronic Claims Management Engine (ECME)• Fee Basis | <ul style="list-style-type: none">• Integrated Billing (IB)• Incident Reporting• Resident Assessment Instrument/Minimum Data Set• Surgery Risk Assessment• Spinal Cord Dysfunction |
|---|--|

The Clinical Environment – Ecosystem for Clinical Information Systems

VistA Context Systems

Extra-enterprise Systems

These systems are those solutions outside the control of the enterprise which must also share information with the EMR solution

VistA Extra-Enterprise Systems

- | | |
|--|--|
| <ul style="list-style-type: none">• Accounts Receivable (AR)• Automated Safety Incident Surveillance Tracking System (ASISTS)• Engineering• Equipment/Turn-In Request• Integrated Funds Distribution, Control Point Activity, Accounting and Procurement (IFCAP) | <ul style="list-style-type: none">• Library• Personnel and Accounting Integrated Data (PAID)• Police and Security• National Provider Identifier (NPI) |
|--|--|

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