THE DEFINITIVE VNA CHECKLIST

✓ **Supports the management and sharing of imaging data across the enterprise**

✓ **Image-enables the patient record**

✓ **Provides medical facilities with all-encompassing ownership of their imaging information**

Essential attributes of a mature vendor neutral archive

A vendor neutral archive (VNA) is a powerful image management system that consolidates imaging information throughout the enterprise into a single, standards-based data repository and seamlessly communicates with all relevant IT systems. Through true standardized data formatting, a VNA provides medical facilities with all-encompassing ownership of their imaging information, cutting the ties with proprietary archives. It leverages advanced technologies to support the management and sharing of imaging data across the enterprise and beyond, while image-enabling a patient record. As the centrally managed point of access to all your imaging information, a VNA provides the foundation for an all-inclusive enterprise-wide image management platform based on DICOM, XDS and other emerging standards.

A VNA can help organizations enhance patient care, standardize workflows across departments and achieve cost savings through economies of scale. But not all VNAs are created equal. To achieve these benefits, it is vital to choose a VNA that's advanced enough to meet your business needs. This guide highlights the essential attributes, qualifications and functionality to consider when selecting a VNA solution.

CRITICAL CAPABILITIES

☐ **PACS aggregation and federation:** The VNA should be able to aggregate query results from multiple disparate PACS to share information between them, while experiencing the image as though it was native to the receiving PACS.

☐ **Dynamic DICOM tag morphing:** The VNA should perform on-the-fly mapping of DICOM data elements and metadata in support of data exchange between PACS. It should also support both inbound and outbound message conversion. Finally, it should use a "self-learning" library of DICOM conformance or have the ability to override certain DICOM tags.

☐ **Pre-fetching/auto-routing (point to multi-point) post fetch:** The VNA should perform HL7 or DICOM modality worklist (DMWL)-enabled pre-fetching of relevant and filtered prior studies and be capable of auto-routing data to the appropriate departmental PACS, either directly or through the local VNA facility cache. In cases where the HL7 or DMWL event does not arrive in time or is simply missing, the VNA should support post-fetching to query both the VNA and the destination to determine if the VNA has prior studies that do not exist in the destination. If so, those studies are sent in parallel with the new study coming directly from the modalities, with duplicates being excluded from the send.

Hyland®

☐ **Support for DICOM and non-DICOM content:** The VNA should offer full conformance with latest DICOM 3.0 SOP classes (SCU and SCP) or conform to DICOM syntax representation. The VNA should be able to ingest both non-DICOM and DICOM conformant or private SOP content and make it available in its native format to the originating system. The VNA should support mobile capture functionality that links content through DICOM or XDS services, allowing for visible light image capture. The VNA should manage this content and make it available inside a standards-based IHE XDS.b registry/repository service.

VNA CHARACTERISTICS
Architecture elements

☐ **Multi-site, peer-to-peer deployment model:** The VNA should support a distributed high-availability model (commonly referred to as disconnected-intermittent and low-bandwidth [DIL] connection types) when required. Remote sites with connectivity limitations should have local access to clinical content, and the VNA should support dynamic synchronization when connectivity is restored.

☐ **Multi-tenancy:** The VNA should support a refined multi-tenancy architecture that allows customers to easily handle internal institutional data separately from both a metadata and storage perspective.

☐ **Advanced high-availability and business-continuance services inside a scalable framework:** The VNA platform should demonstrate high-availability capabilities, internally and through load-balanced distribution, VM deployments, clustered data center(s), and ultimately, dual data center implementations. As traffic loads grow across the enterprise and new sources of content enter the system, the VNA must function as if it is adding appliances to handle the new or peak loads in an N+1 architecture, assuring its ability to scale up, out and plan for infrastructure obsolescence. This architecture is mandatory for cloud-based deployments.

Vendor characteristics

Not all VNA vendors are created equal. Ask questions about the history of the vendors you are considering. Do they adhere to industry standards to support interoperability? How many PACS have they migrated from? How many migrations have they performed?

☐ **VNA implementation track record:** Look for a VNA solution provider with at least 10 years of experience archiving and migrating studies in a vendor neutral format from multiple PACS vendor systems. Experience counts not only in building and implementing VNA software, but also in the number and variety of migration projects.

☐ **No future migration charges for archived studies or XDS content:** When using standards for ingesting and storing data, a VNA vendor should not require a migration charge for the archived study data in its system due to a software upgrade, new platform or change in storage media or location. The tools for migration should support the customer's ability to leave the VNA vendor's platform at will, at no charge.

☐ **Expected IHE integration profiles:** To ensure interoperability, the VNA should conform to the technical framework as outlined by the Integrated Healthcare Enterprise (IHE). To ensure IHE conformance, the VNA vendor should readily publish an IHE integration statement at least annually. The IHE integration statement should be mapped against demonstrated interface testing that can be found on the IHE website in the **IHE Connectathon** testing section. In addition, VNA vendors should have, at a minimum, no less than five years of demonstrated IHE Connectathon testing results to ensure the VNA conforms to published integration specifications.

True independence

☐ **Independence from any single, underlying infrastructure:** As healthcare information management infrastructure moves towards a variety of infrastructure technologies, including cloud-based platforms, data and vendor infrastructure independence becomes increasingly important. The VNA should support API-level integrated and mixed architectural connectivity models, both in and out of on-premises, hybrid, and/or cloud vendor platforms.

☐ **Hardware independence:** The VNA should be server hardware independent. It should have primary and secondary mirrored subsystems and provide for active-active or active-passive modes with automated failover and automated reconciliation between multiple subsystems. This will assure successful business continuance and high-availability services. Check for the ability to support VMware and virtual IP configurations with failover.

☐ **Vendor independence:** The VNA should support a variety of different viewing technologies using a variety of protocols (WADO-RS, QIDO-RS, STOW-RS, native web service, DICOM-direct integrations, MINT) since viewing needs can differ for various roles within the organization. It should support tailoring the viewer to the clinical specialist. Independence also means the viewer could run cacheless, obtaining images directly from the VNA in most situations, especially if referential or clinical viewing is necessary.

Interoperability and data exchange considerations

- **Enterprise XDS capabilities:** The VNA should support automated creation and publishing to an XDS repository of XDS-I manifests for all data objects ingested by the VNA. This helps establish the framework for image sharing with ACOs and HIEs. It also supports exchange on an enterprise basis with other partnered organizations and non-DICOM clinical content. Profiles such as XUA, XCA, XSD, and XDS-I are key IHE components supporting interoperability.

- **Data migration engine:** The VNA should include built-in software for use in future data migrations. During migration, the VNA should allow access to prior studies in the legacy archive federating it as the new system comes online. More importantly, make sure the system supports an on-demand migration of the entire patient jacket for patients having a scheduled procedure. This simplifies the migration process. Also, make sure your VNA vendor has experience with media direct migrations.

- **Data integrity:** The VNA should perform synchronized updating of metadata (patient/study-level changes) through a journalized approach within the actual image data. Make sure it allows for automated disaster recovery should the database become unavailable as the database and image content sync. The journal can be used as a historical audit of when, what and how metadata content was changed. Make sure the VNA also has a duplicate-handling process, including the ability to manage duplicates per the AE Title based on your needs. One of the following techniques is required: keep all, keep first, keep last, keep by DICOM tag or keep by CRC and pixel validation.

- **RIS and order filler updates, merges and deletes:** The VNA should propagate updates received from RIS or via manual update to all destinations that received studies in order for all available patient information to stay synchronized, including HL7 or DMWL updates, merges and delete operations. This ensures a change at one source is replicated to all instances of the VNA. The VNA should also support deprecation operations via image object change management (IOCM) or web-services-based calls for those PACS systems that do not yet support the IHE IOCM profile.

- **Image exchange as a feature:** Sharing of images with affiliated and unaffiliated organizations is a must, and therefore image exchange should be an inherent feature of the VNA platform. The VNA should have the ability to coerce the patient identity (PID) schemas related to the requesting organization both in and out of affiliates while preserving the originating organization's PID schema. It should also provide the ability to validate BAA, patient release and user authentication.

- **Patient identity cross-reference, PIX manager services:** Given that health information exchanges (HIEs) are becoming the norm within the "learning health system" as defined by ONC, the ability for a VNA to abstract through a PIX manager service a PID correlation layer is now a requirement. The VNA should support PIX HL7, version 2 (PIXV2) at a minimum.

- **MPI integration and identity services:** While it is a slow and difficult task, most organizations have or are recognizing the importance of a master patient index (MPI). The VNA must support use of an existing MPI/EMPI, support its own internal MPI, and more importantly, support the transition over time from local PID schemas into an MPI-based environment that supports adoption of the use of Fast Healthcare Interoperability Resources (FHIR)-based query interface services.

- **Web service access for direct EHR or application integration:** Organizations have spent significant capital funds on their EHR solutions. Due to these significant investments, important integration points should be available inside the VNA through direct web service integration which leverages FHIR as an option for interoperability.

- **Discrete data extraction and migration:** The VNA should be capable of supporting discrete data extraction and transformation through an advanced migration service that links the content within the VNA's architecture to discrete data that can support advanced future reporting.

- **Confirming the contents of PACS to the contents of the VNA:** To support data changes between the VNA and connected PACS systems, the VNA should support the IOCM IHE profile. If IOCM is not available, a VNA-PACS synchronization service must be provided. IOCM or the provided synchronization service should specify how one connected system communicates local changes applied on existing imaging objects to other systems that manage copies of the stored imaging objects within the VNA. The supported changes should include: (1) Object rejection due to quality or patient safety reasons. (2) Correction of incorrect modality worklist entry selection. (3) Expiration of objects due to data retention requirements. The VNA should define and manage how changes are captured and how to communicate these changes between connected systems.

SOPHISTICATED INFORMATION LIFECYCLE MANAGEMENT (ILM)

☐ **Intelligent clinical ILM:** The VNA should facilitate data movement and retention, both internal and external to the system, based on clinical metadata associated with the study, including metadata such as date, type, patient age, usage and slice thickness. Make sure the VNA can provide a separate ILM strategy for each organization or specialty. For example, mammography has a very high recall rate vs. cross sectional CT node/database (facility or department). Check for automated, user-defined data purge capabilities. All this must be configurable by the customer and not done via continuous professional services engagements.

☐ **Performance analytics capability:** Analytics integration with third-party applications can leverage direct database access, provide for access via web services, or access to metadata through MINT interface access solutions. A knowledge-based performance analytics tool should be mandatory.

USABILITY FEATURES

☐ **Simple web-based user interfaces:** The VNA should demonstrate shared configuration across VM tiers, shared audits across the VM farm, and shared tracing and logging across the VM farm for simplifying diagnostics.

☐ **Support for workflows using web services:** To ensure flexibility in workflow processes, the VNA should use web services within its workflow orchestration. Studies need to be moved between destinations and metadata should be potentially morphed to satisfy local domain definitions via web service requests.

☐ **Supports dashboard functionality to simplify management:** The VNA should provide simplified viewing and linking of traffic flow using AE Title SCU and AE Title SCP/Port that supports routing and cleansing rules, mapping and morphing rules, local VNA or other destinations, and storage in one pane of glass – all configured by the customer with no professional services or engineering engagements required by the vendor. The VNA should provide this as a dashboard level of functionality that allows for complete performance management of the VNA.

☐ **Enterprise image viewing capabilities:** VNA requirements should mandate an integrated viewing platform that consists of both DICOM and non-DICOM consumption at three levels. The three levels of viewing should include diagnostic, clinical/referring, and patient-level viewing, with both 2D and 3D capabilities.

Learn more at **Hyland.com/Healthcare**

Hyland®