



Defining
EXCELLENCE
in the 21st Century

Towards a VA National Learning Health System in Anesthesiology:

A Summary Anesthesia Model (SAM)

*A Health Solutions Management Brief
for VA National Anesthesia Service
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VA Anesthesia and Critical Care Information Management Systems

Background: Automated anesthesia record keeping (ARK) and critical care information management systems (CIS) from multiple vendors are deployed at 129 VA hospitals to support day-to-day clinical operations and automated record keeping in the OR's and ICU's.

Opportunity: Most of this information remains within the within the vendor's database at the local site, or is published only in unstructured form. It is therefore not fully leveraged for national quality, access, or outcomes improvement.

Inspiration: What are examples of successful national perioperative quality improvement initiatives?

Challenges: What are the challenges to achieve integration for national anesthesia quality improvement in VA with our CIS/ARK systems?



VA Anesthesia Information Systems

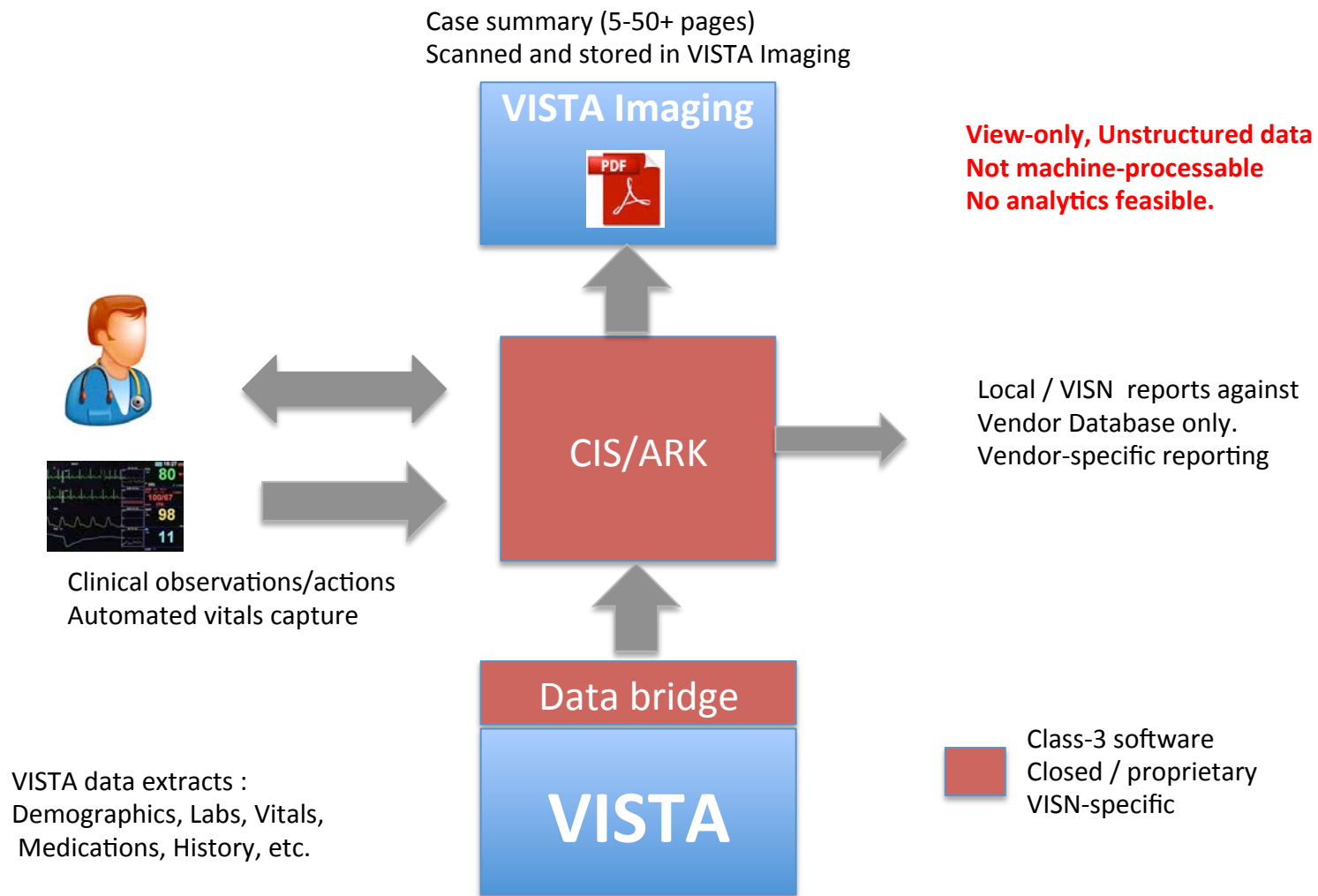


VA Anesthesia Information Management Systems

- Commercially licensed vendor-supported products
- VISN-centric organization, deployment, configuration, management, and maintenance
- Data stored on vendor's database in each VISN.
- VA class-3, field-managed software:
 - Not VA developed, integrated, or maintained
 - Multiple, external commercial products
 - Products not listed on VA TRM
 - Not leverage VA VISTA architecture
 - Not nationally integrated, updated, standardized, or maintained

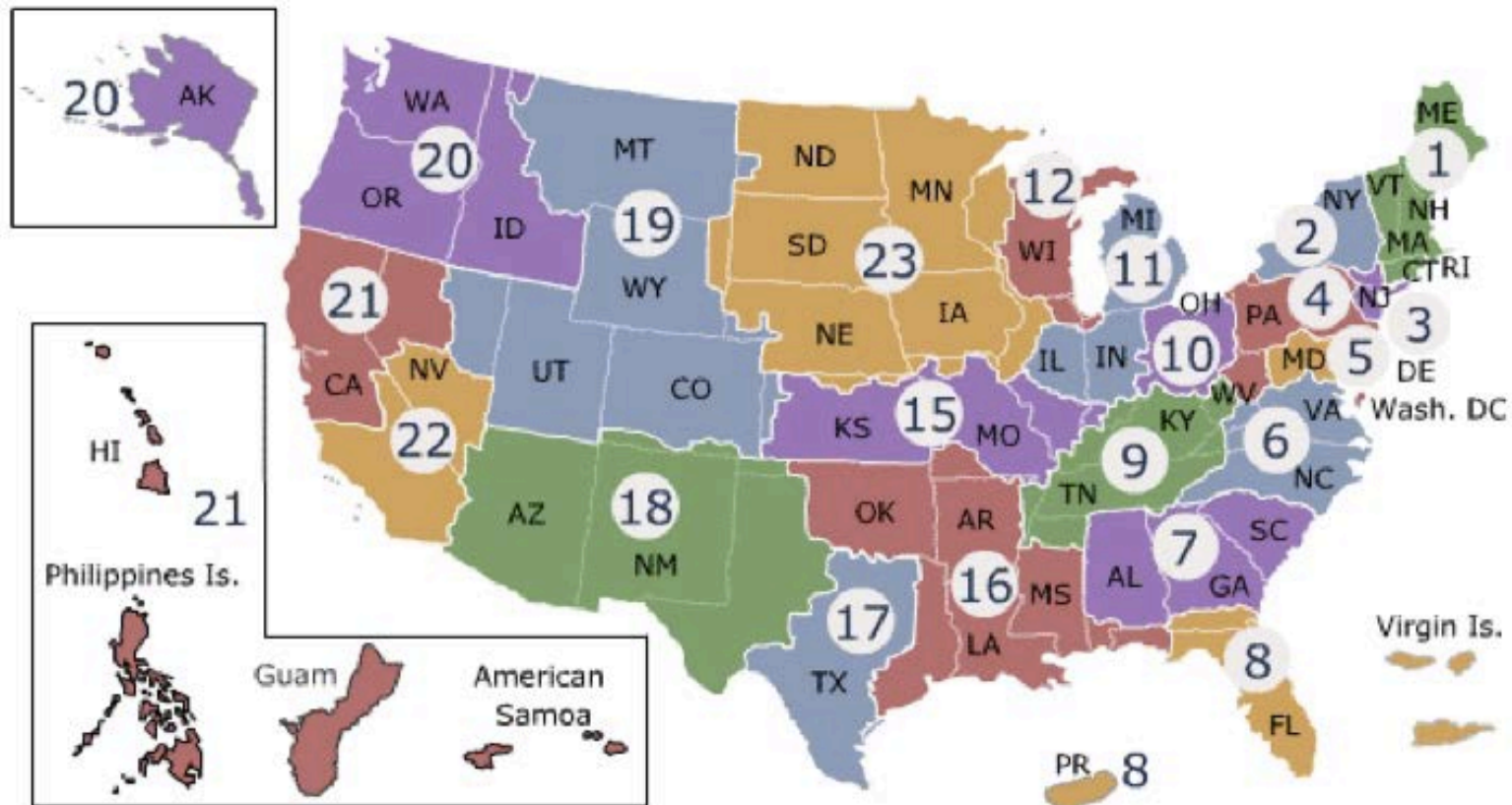


VA Anesthesia: Overview of components and data flow (Local View)





VA Anesthesia: VISN-centric deployment (National view)





VA Anesthesia: Overview of components and data flow (National view - Current)

Case summary (5-50+ pages)
Scanned and stored in VISTA Imaging

VISTA Imaging

PDF

PDF

PDF

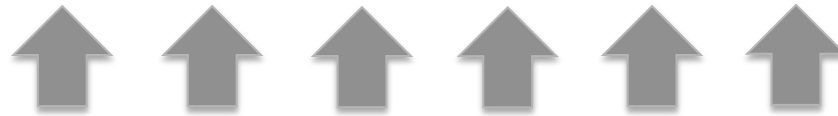
PDF

PDF

PDF

View-only, Unstructured data
Not machine-processable
No analytics feasible.

Vendor-specific
Storage format



CIS/
ARK

CIS/
ARK

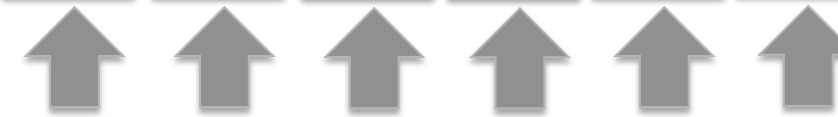
CIS/
ARK

CIS/
ARK

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CIS/
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Vendor-specific
Systems



bridge

bridge

bridge

bridge

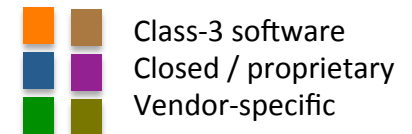
bridge

bridge

Vendor-specific
Data bridges (x6)

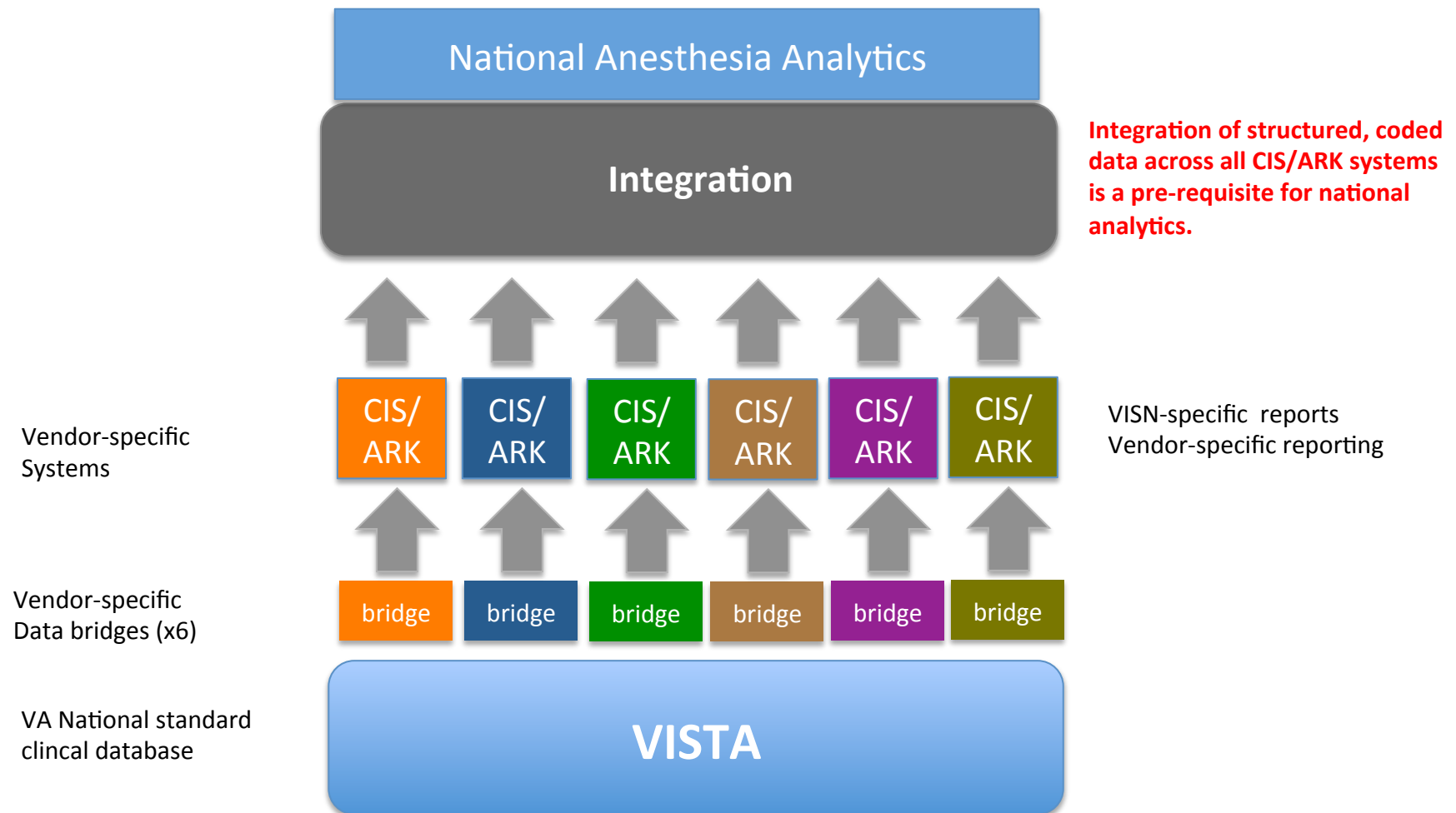
VA National standard
clinical database

VISTA





VA Anesthesia: Overview of components and data flow (National view – Desired)





Integration Model I:

***VA Surgical Quality
Improvement Program
(VASQIP)***

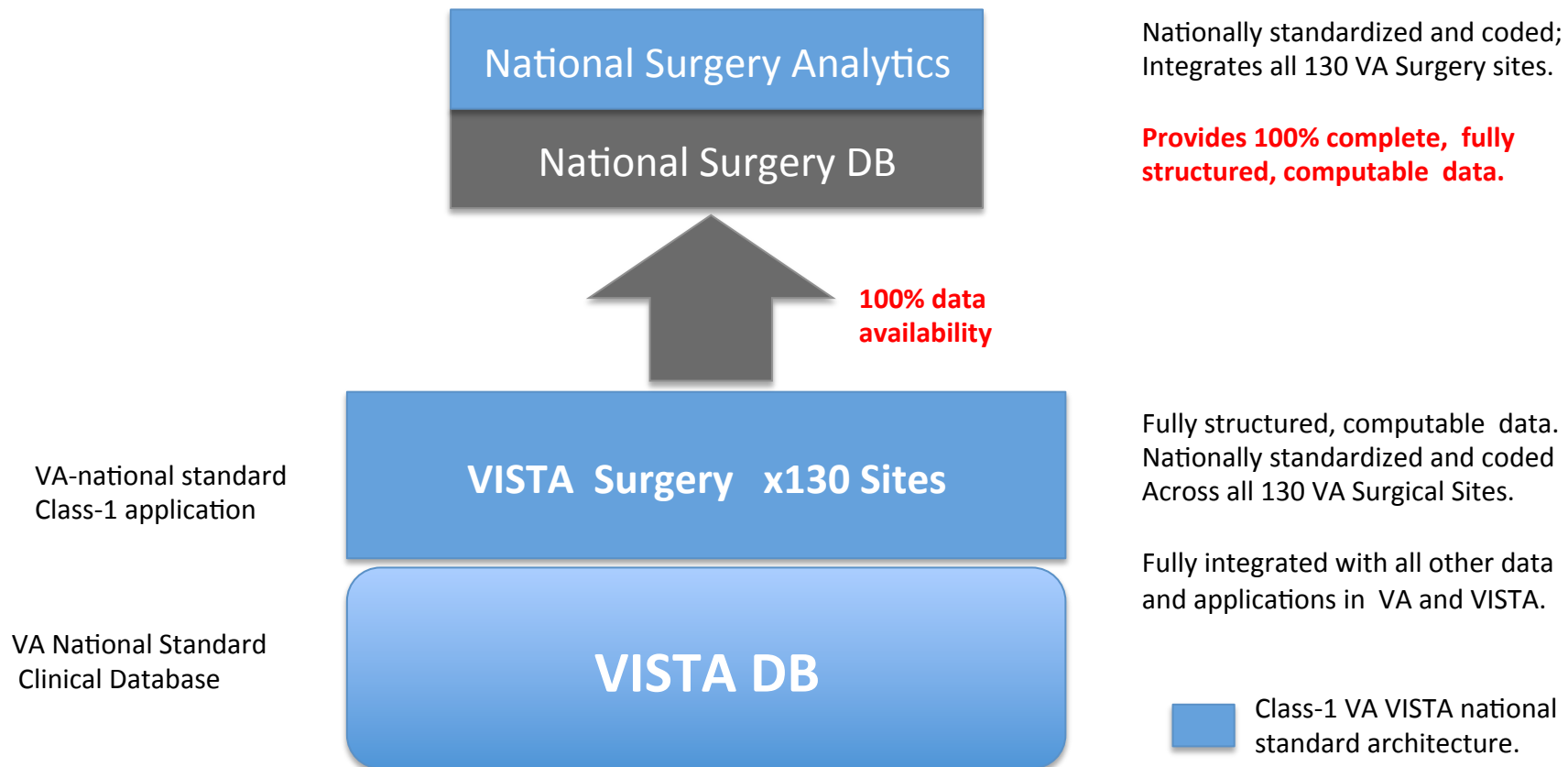


VA Surgical Quality Improvement Program (VASQIP)

- Leverages existing VISTA Architecture
- Class-I VA nationally standardized architecture
- OIT architecture, design, testing, standards, and support
- All updates deployed nationally and synchronously via fully automated means
- All VA sites use the same, standardized VISTA database
- No integration required; all data is captured to the national standard from the field at all sites from the outset.
- All data of VISTA Surgery is available to all 160 VISTA applications, to CPRS, and to all other components of VA's architecture, including the VISTA Evolution platform.
- Set the standard nationally outside VA as the SQIP
 - Over 600 hospitals outside VA have adopted the VASQIP model

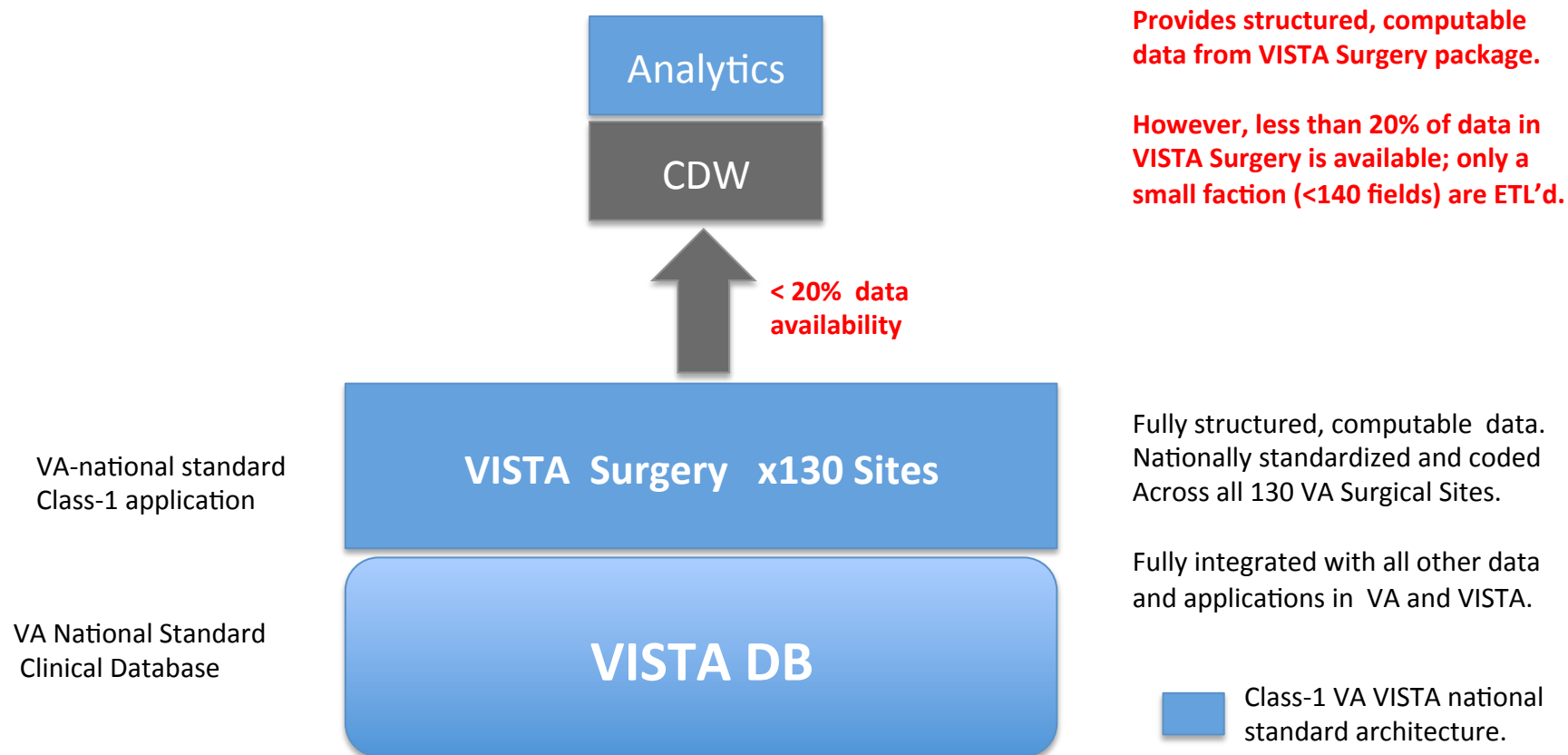


VASQIP: Overview of components and data flow (National view)





VASQIP: Overview of components and data flow (National view)



VISTA Surgery fields in FM file 130 is 570; CDW fields from same file is 140.

INTERNAL USE ONLY - INFORMATIONAL



Integration Model II:

***ASA Anesthesia Quality
Institute (AQI)***



ASA National Anesthesia Quality Improvement

- In 2010 the American Society of Anesthesiology (ASA) launched the Anesthesia Quality Institute (AQI) and established the National Anesthesia Clinical Outcomes Registry (NACOR).
- Participating practices report their practice data to NACOR, and this information can be used for quality improvement, benchmarking, and research. Reporting from NACOR and access to its analytic tools is a benefit of all ASA members.
- In 2014 NACOR was designated by the Centers and Medicare & Medicare (CMS) as a Qualified Clinical Data Registry (CQCR). This designation means that practices reporting the appropriate clinical outcome data will fulfill their quality reporting requirements and thereby avoid cuts in their Medicare payments.
- As of September, 2015 NACOR has aggregated and analyzed 30 million cases registered for quality assessment.



ASA National Anesthesia Quality Improvement

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Anesthesia Data Conference 2015
AUGUST 28 | ASA Headquarters | Schaumburg, IL

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30,236,893

Cases in NACOR

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ASA National Anesthesia Quality Improvement





AQI Data Output





ASA National Anesthesia Quality Improvement



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Practice ID: 3 Practice Name: AQI Demo Practice Username: aqi

LogoutInstructionsPracticeProvidersFacilitiesTechnologyData LoadsReportsUsers

AQI PRACTICE DASHBOARD


Your practice is not registered for 2015 PQRS reporting through NACOR.
Please [contact us](#) for more information.

[AQI Anesthesia in the US 2015 \(pdf\)](#)
This annual publication (complimentary to AQI members) contains abstracted descriptive statistical information about the profession of anesthesiology.

We request your help by answering a [short survey](#) regarding your practice. The results from this survey will be used to help ASA better understand anesthesiologist practices to help in the development of educational products as well as meetings.

1 of 1Find | Next

AQI Demo PracticeDate: 8/20/2015





AQI Reporting Services - Practice Report


Practice Name:	AQI Demo Practice
Member Since:	12/22/2009
AQI Contact:	Lance Mueller
Last Date of Service:	2013-02-28
Cases Submitted to Date:	11,320
Number of ASA Members:	6
Number of NON-ASA Members:	7

Current Status


SURVEY


 Facilities


 Providers

 Technology

DATA

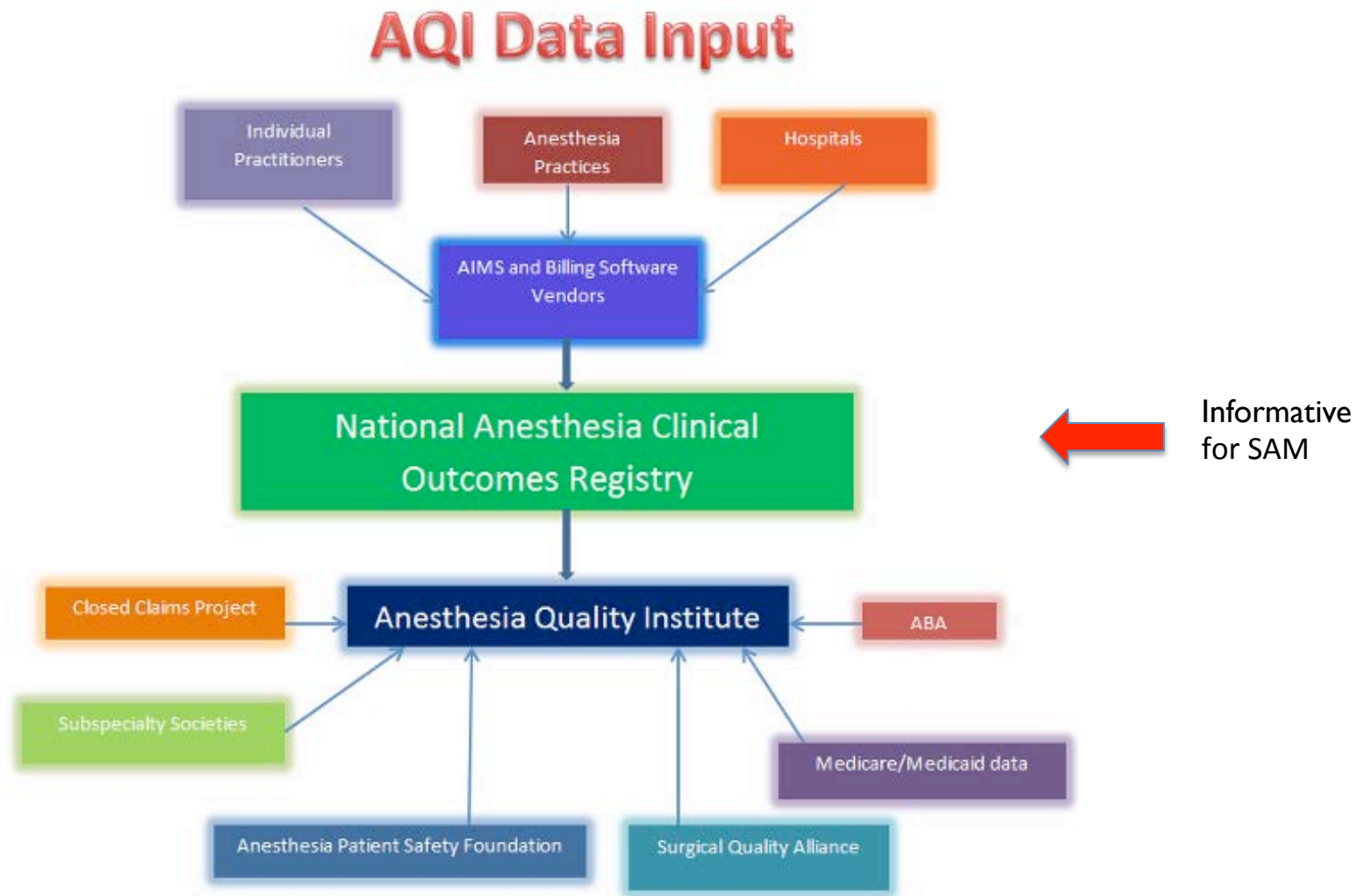
 Cases

 Outcomes

 Monthly Upload



ASA National Anesthesia Quality Improvement





Integration Model III:

Vendor Terminology

Superset Map



CIS/ARK: Superset Terminology

Strategy: Create a master terminology and delegate vendors to map their systems to this terminology. The model becomes a superset accommodating all vendors' terminology.

Implementation:

- VA nursing full-time for two years created an initial terminology.
- VA committee met weekly over five years to supplement the terminology. A brainstorming tool (Mindmap) was used to capture all terms.
- Each vendor independently maps their own terminology to superset. Vendors do not expose or involve VA with their terminologies directly.
- Vendors supplement the terminology with their own system's terms if no mapping was available for their specific vocabulary. No inter-vendor collaboration to enforce concept convergence is required.

Status:

- The terminology has grown steadily since its inception.
- Terminology has grown to over 36,082 terms as of August 2015.



CIS/ARK: Superset Terminology

Domain	Vocabulary	# Terms
IntraOp Care	ARK 1.7	6753
PostOp Care	PACU v1.7	8958
Critical Care	ICU v1.7	20371
TOTAL		36,082



Current ARK Summary

Of the total 6753 terms defined for ARK, 5901 are for anesthesia technique. Of these, most of them define procedures such as line placement. However some terms remain under- or un-defined.

Definition	Examples of terms (# definitions)	Effect on mapping	Effect on information content
Over-definition	Peripheral IV (880) Arterial line (617)	One-to-many (unpredictable and variable)	Redundant, unnecessary information
Under-definition	EKG: (1)	Many-to-one	Loss of all meaning and context
No definition	Vitals (0) Medications (0)	Many-to-none (no mapping)	No information carrying capacity. Complete loss of data.

*To be useful, a terminology should have clear, well defined, unambiguous, **one-to-one mapping** between terms for all stakeholders of the terminology.*



Integration Model IV:

Summary Anesthesia Model (SAM)

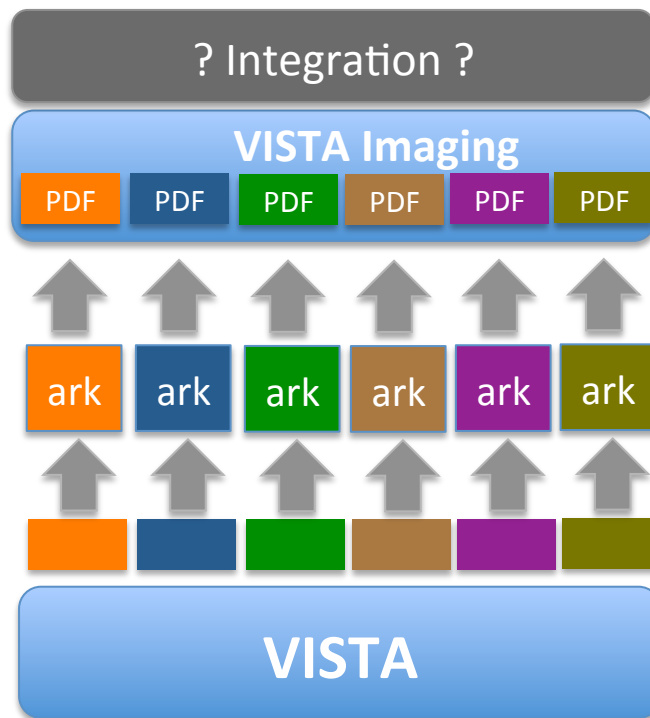
***Also known as simple, small, subset,
summary-oriented (S4) metadata model***



VA Anesthesia: **National view (As-Is)**

How do we leverage the VA Enterprise Architecture to enable anesthesia record use for national reporting?

Currently, all national ARK data is stored in unstructured form in VISTA (PDF).

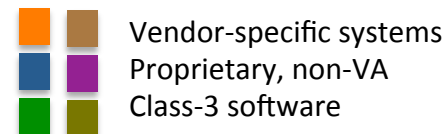


National Reports

Integration of structured, data across all CIS/ARK systems is a pre-requisite for national reporting.

Vendor Reports

Currently only reports against Vendor-specific databases is possible. There is no cross-vendor reporting.





Summary Anesthesia Model (SAM): **Objectives**

Objectives of SAM:

To maximize efficient information transfer between providers in the anesthesia and critical care care setting (comprised of high volumes of time varying machine-generated data) this will be outcomes- and summary-focused, rather than procedural details.

A concise model will allow metadata about the ARK records to be concisely summarized and exchanged and integrated based on summative metadata.

This will improve the succinctness and "signal to noise" ratio that is prevalent in critical care using a human "first pass filter" to provide the annotation and metadata immediately after the end of the case.



Summary Anesthesia Model (SAM): **Attributes**

Attributes of SAM:

- **Small** (no redundancy; maximum size limit)
- **Simple** (easy to map)
- **Summative** (trends, vitals, significant events capture)
- **Standards-focused** (linked to LOINC, SNOMED, RxNORM)
- **Interoperability-focused** (VA-DoD, VA-AQI, VA-private sector)
- **Lightweight** (easy to implement)
- **Modern** (web-centric, web-standard technology)
- **High-quality** (continuous peer-review)
- **Practice-driven** (informed by operational systems, AQI, etc.)
- **Literature-linked** (literature must support use of terms)
- **Open-licensed** (for universal distribution and use)



Summary Anesthesia Model (SAM): **Attributes**

Applications of SAM:

Beyond providing exchangeability of ARK charts between VA sites, and between VA-DoD, this will provide care improvements to veterans:

- High reliability ***clinical handoffs*** for the (PACU, ICU, floor) teams for transitions of care on the day of surgery
- ***Consistent follow-up care*** information for any special post-op care days in the days to weeks after the procedure
- ***Advisory for anesthesiologists*** taking care of the patient months to years after the procedure to assure patient safety
- ***Outcomes research enabler*** for all time in the future, as this will contain key metadata for cohort selection allowing risk-adjusted comparison of anesthesia techniques intraop with the patients outcomes months to years later.



Summary Anesthesia Model (SAM): **Application**

A summary anesthesia model (SAM) applied to ARK reports within the VISTA architecture allows enterprise-wide query to support national anesthesia reporting.

SAM provides the structured data required to query, retrieve, index, and index ARK records nationally in the VA VISTA architecture.

