Terminology Services

For the enterprise application environment utilizing the SOA Paradigm

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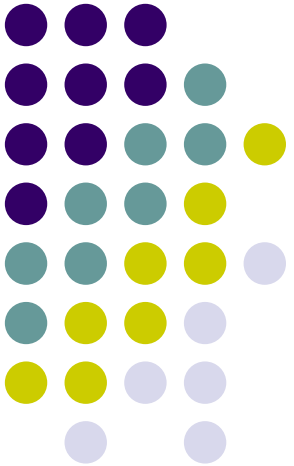

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Vocabulary Services Group

Today's goal:

- Describe the challenges faced during the requirements and design of a services based terminology architecture in a large health care organization and highlight our approache to mitigate those challenges.

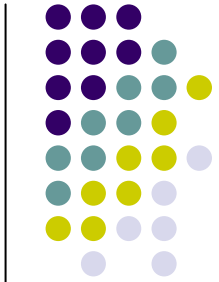
Investing in Data Quality

"*The only people who need not worry about data quality are those who neither create nor use data. No one participating in any modern economy can make that claim.*"

Data Quality: The Field Guide, Thomas C. Redman, Ph.D.

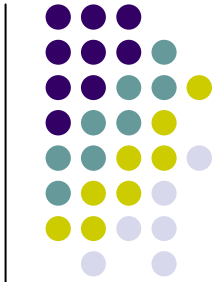
Digital Press, 2001

Investing in Data Quality



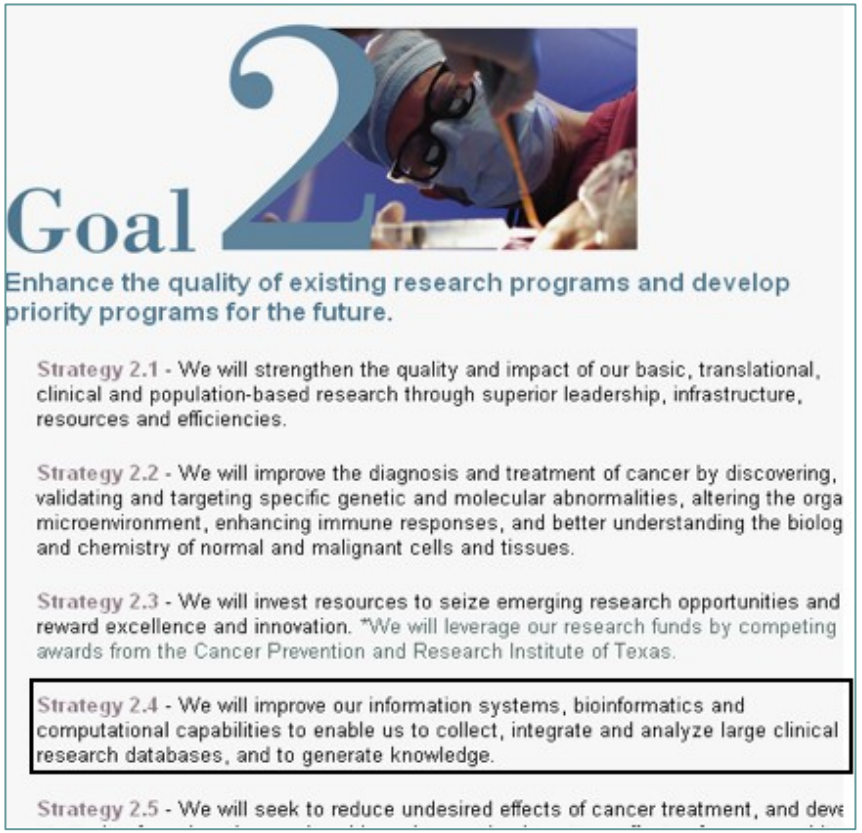
- Operational Efficiency Gains
  - Reduce time for analysis, correction, reconciling; and enhance decision-making
  - Eliminate regulatory fines, penalties
  - Reduce errors exposed to patients, regulators
  - Lower costs associated with data redundancy (leverage system of record)
  - Projects are more predictable and overruns are decreased
  - Lower expense to adopt new technologies (integration, security, storage)
  - Accelerate bench to bedside (translational research)

Investing in Data Quality



- Customer Service
  - Increased Patient Satisfaction
  - Improved Employee Satisfaction
- Regulatory
  - Increased Patient Safety
  - JACHO
- NCI data requirement interoperability
- Revenue Maximization
  - Improve brand penetration (market disease management)
  - Reduce days in Accounts Receivable (accurate billing)
  - Transparency to CMS standards of care

The 5 yr plan - Investing in Data Quality!



Strategy 2.4- We will improve our information systems, bioinformatics, and computational capabilities to enable us to collect, integrate, and analyze large clinical research databases, and to generate knowledge.

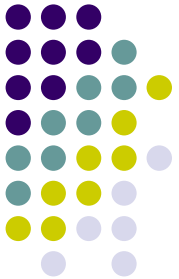
The goal!

- Interoperability
  - Syntactic Interoperability - the wire
  - Semantic Interoperability - the meaning
- Information re-use
  - Communication
  - Knowledge sharing

Why bother?

- Purposes of Standardizing Vocabularies
  - For language understanding -
    - Cell, Cold, Fundus, Mole, Alcohol
    - Context is critical!
  - For translational research and data integration
  - Improving links between clinical, research and administrative systems
- Purposes of Metadata
  - Provides the data about the “data”
  - Provides content, quality, condition and characteristics of data
  - Helps identify issues around the meaning of each object/attribute in a system

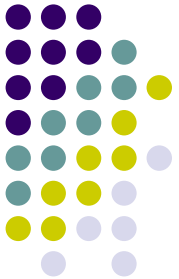
What does a Terminology Standardization/service get us?



- We create the terminological resources so that they can be implemented in applications to represent relevant information (whether its clinical, research or administrative) in a semantically structured form which provides for automated re-use by applications
  - Codes with formal and explicit meaning

Kent Spackman, 2005

Semantic interoperability is tough!



- 3 major standards and their interactions need to work together to get semantic interoperability:
  - Terminologies/ontologies
  - Information models and architectures
  - Standards for decision support/guidelines

Kent Spackman, 2005

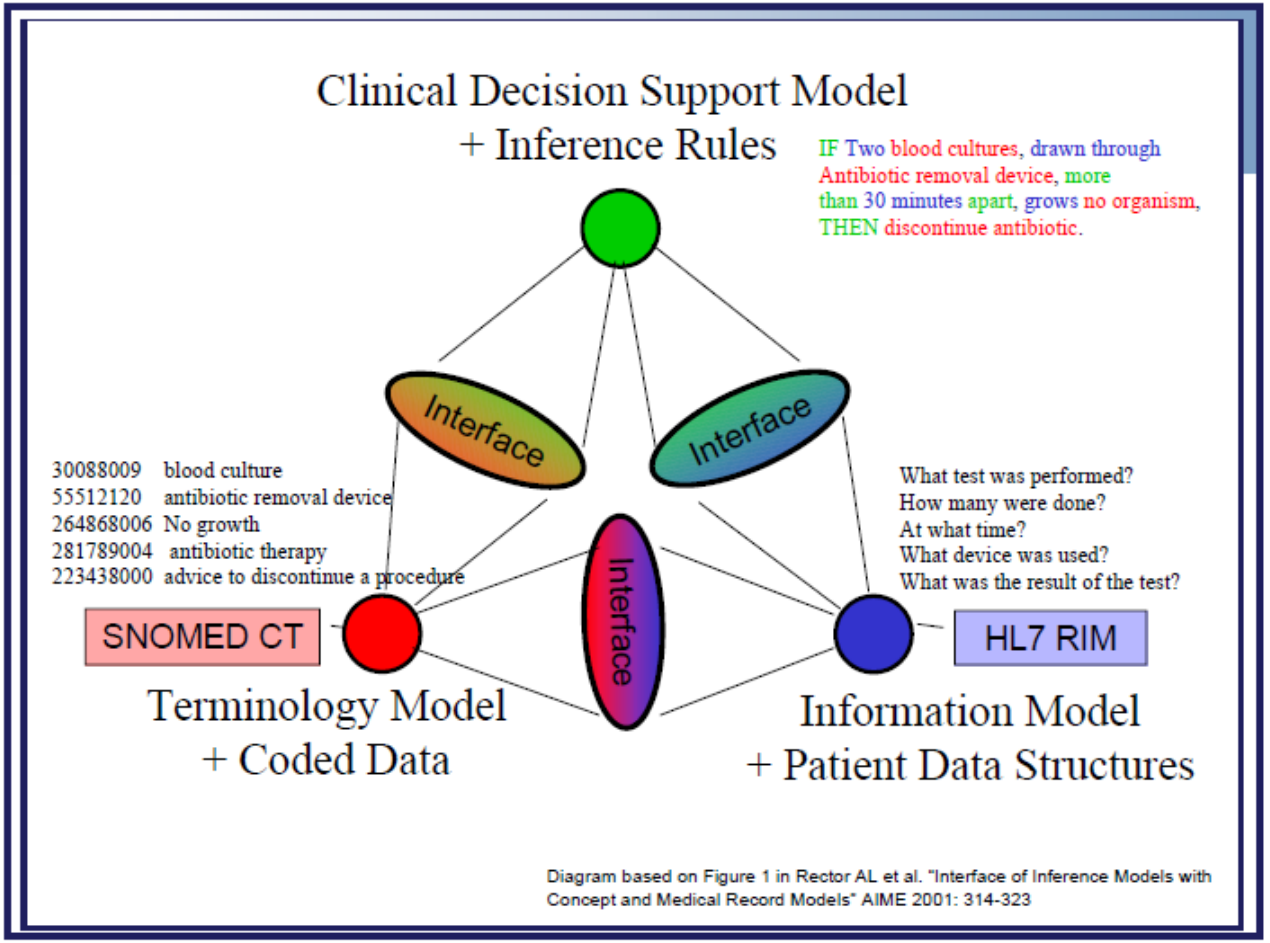
It’s a balancing act!

- The simplest information Model
  - 1 field: Put all information here _____
  - Everything is Terminology
- The simplest Terminology Model
  - Two values - Yes /No
  - Everything else is a Field name

Kent Spackman, 2005

The Three Legged Stool…

Example: Clinical Decision support



Kent Spackman, 2005

The Challenges

- Support the vision of an academic med center that has decided to take a new approach to systems integration using SOA and Web services
- Implement an enterprise infrastructure for Vocabulary/Ontology and Metadata about data to support legacy applications, internally developed applications, vendor applications, and future applications
- Develop an infrastructure that supports clinical, research, and administrative domains, not just one

The Challenges

- The priorities, the landscape, and Healthcare is undergoing on-going change
  - HIT prioritization in the current administration for example
  - People can only “handle” so much “change”
- External organizations are increasingly requiring healthcare groups to adopt and meet IT standards and practices, particularly around data elements, messaging, and terminologies
  - Eg: FDA, CDC, NCI, NIH, HIT-Policy , HITSP, etc..

The caveats

- No chance to stop the bus!
- Ongoing new mandates:
  - New Messaging regulations - 5010
  - New Vocabulary Mandates:
    - ICD10
    - ICD10-PCS
    - HITSP recommendations
    - CHI standards
  - New Data standards
    - caBIG CDE's
    - Internal CDE mandates

Benefits of SOA

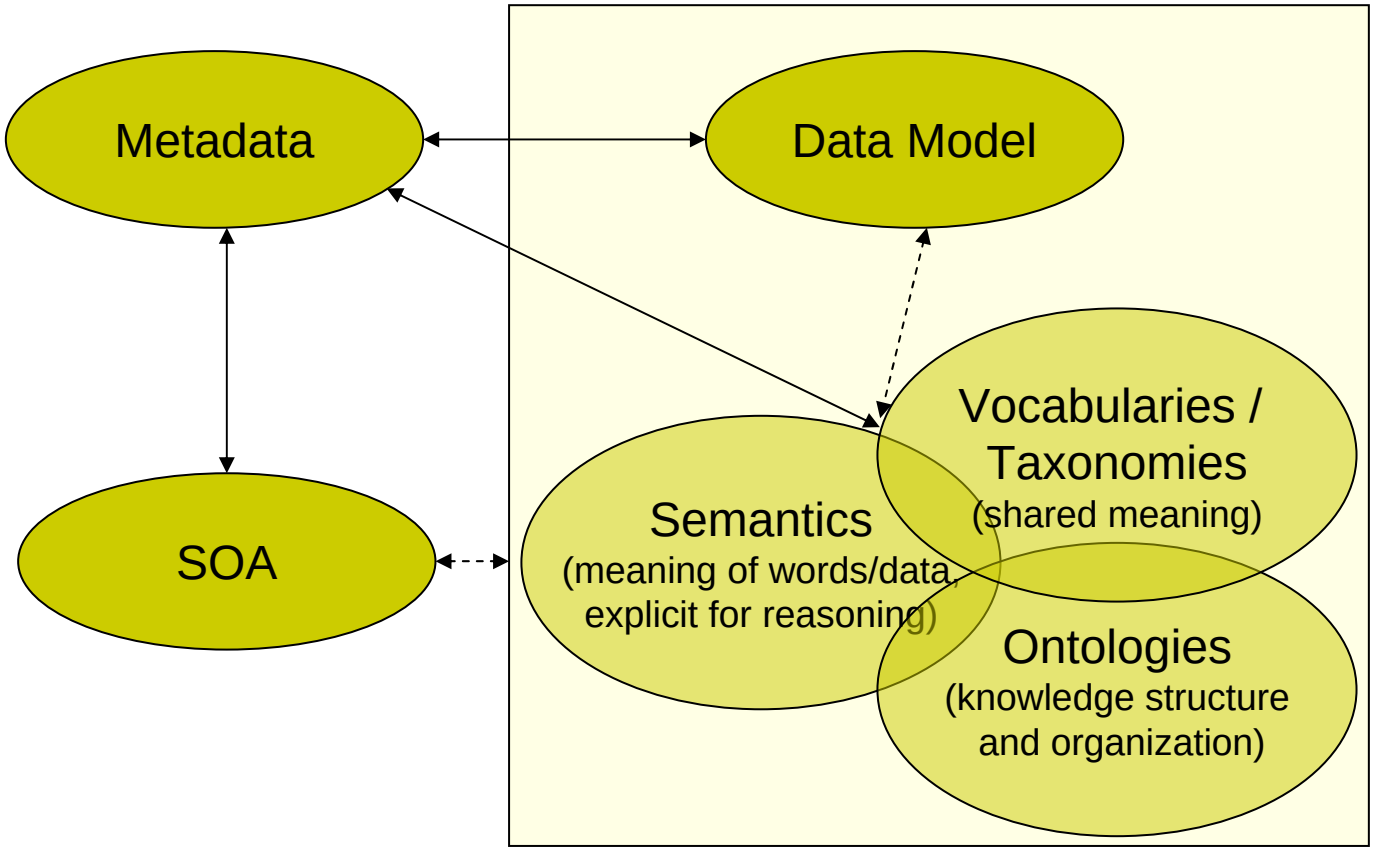
- SOA provides a way to implement terminology services that are standardized and better automated across a large enterprise landscape, therefore driving semantic interoperability

Reality check:

- The vocabulary ontology efforts must be aligned and integrated with the Metadata/data modeling efforts and the SOA initiatives to adequately address the challenges!

Synergy conclusion!

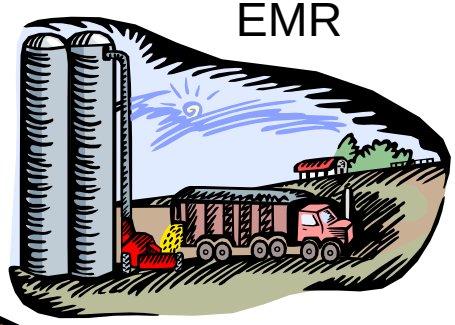
Synergy - the sum of the whole is greater than the individual parts

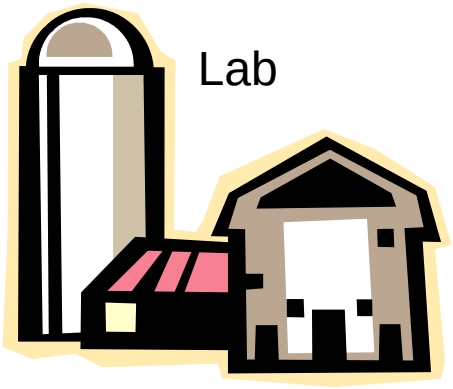


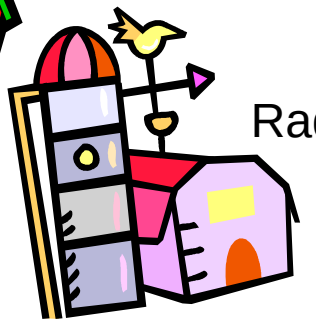
The undertaking…

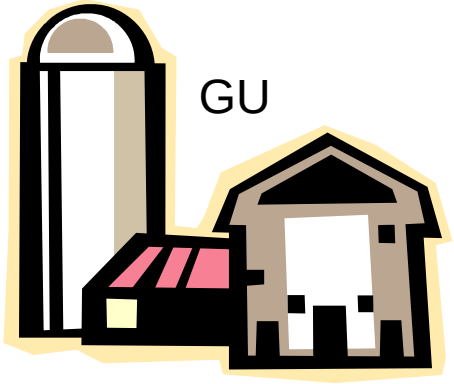
- Launched a targeted integrated activity - spanning SOA, Data Modeling, and Vocabulary/Ontology
  - keep up and get ahead of the Federally mandated requirements.
  - Optimize the interfaces between these three to advance IT infrastructure to overcome the challenges and provide an infrastructure that supports dynamic application delivery and information re-use across all domains (clinical , administrative, and research)

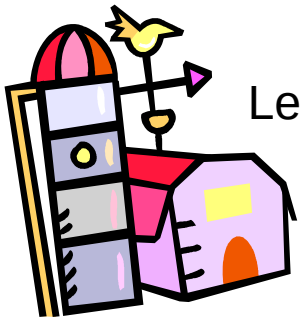
The MDACC application landscape - 2004



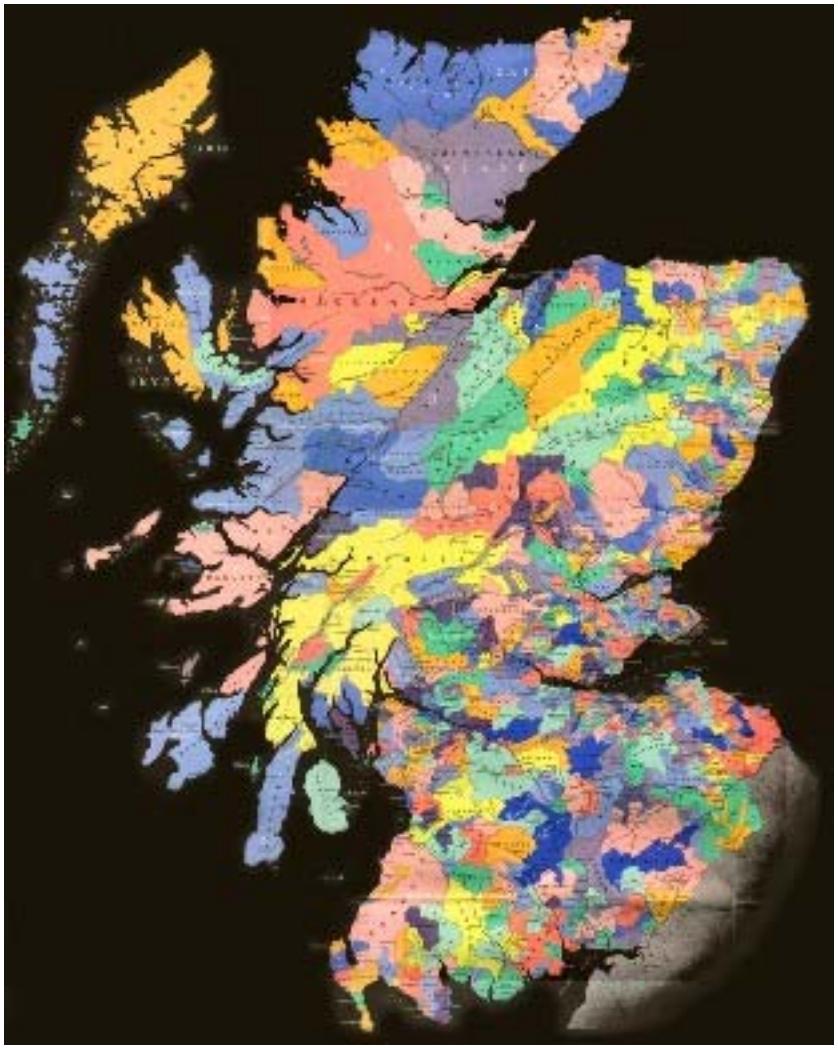








For our British friends:



- Fiefdoms (typical and Atypical) :
  - Lab
  - Radiology
  - Sarcoma
  - Neurosurgery
  - GU oncology
  - Melanoma
  - Lymphoma
  - Leukemia
  - BMT
  - Etc.,etc, etc, etc, etc, etc, etc,etc,etc,etc,etc….

The Landscape: 2006

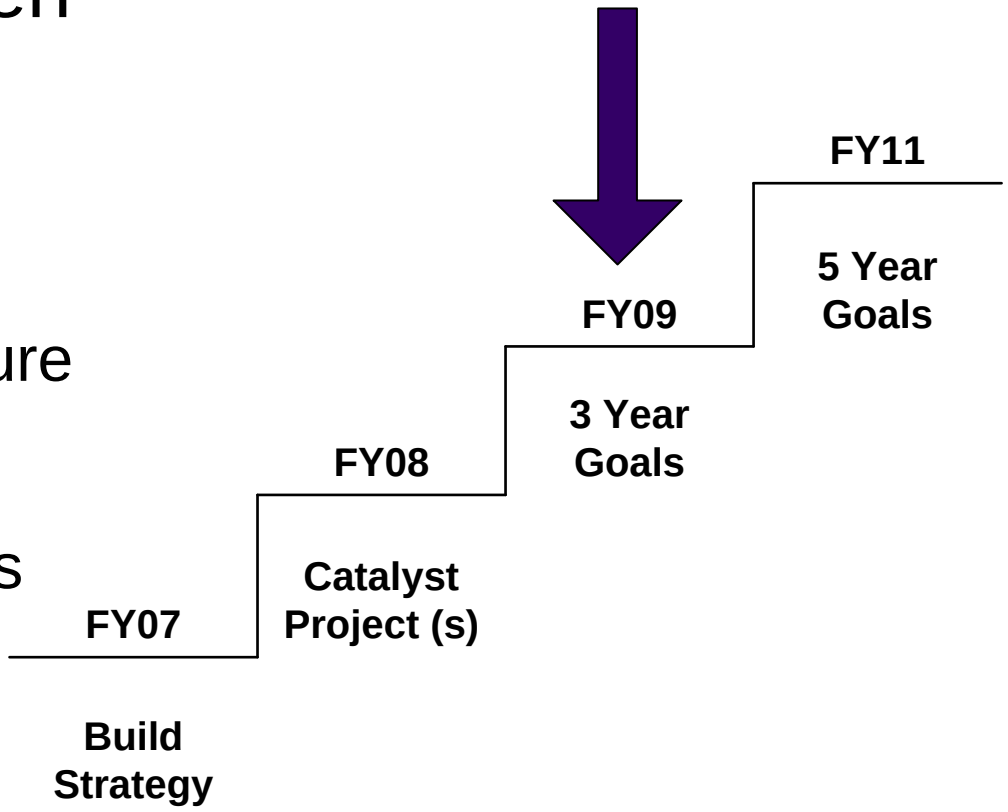
- The Usual Suspects – Enterprise Wide
  - Complex Applications
  - Many Interfaces
  - Numerous Databases
  - Assorted Informal Processes for Sharing Data
- Need for standards
  - Multiple terminologies in place
  - Integrated with Data Modeling
  - No governance of development process

Action Items - 2006

- Getting Started
  - Develop Roadmap
  - Establish Forum for Communication
  - Form Teams
    - Data Governance/Stewardship
    - Repository / Meta Data
    - Ontology / Master Data
    - Integration
  - Conduct Maturity Assessment

Following the roadmap

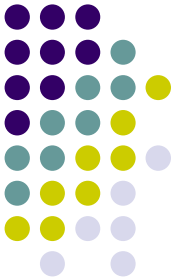
- Where we have been
  - Guiding Principles for Governance
  - Infrastructure
  - Support Team Structure
  - Catalyst Project (s)
  - Measures for Success
  - 3 - 5 Year Goals



Get help from experts! 2007-8

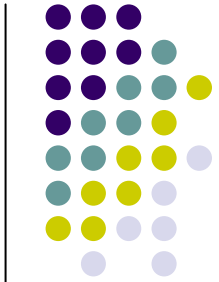
- Vocabulary Services (OntoReason)
  - “deficiencies in terminology / vocabulary domain skills among our software development teams and our application teams, and demonstrated an inability to discover, re-use, or share these terminologies / vocabularies”
- Data Modeling Assessments (Hewlett Packard)
  - “such accessibility difficulties…continue to challenge our ability to speed results from clinical and basic scientific research into the patient care environments.”
- SOA Governance (Avanade)
  - “challenge is how to make this data available to the clinician and the researcher using services”

Vocabulary Services Goals and Motivators



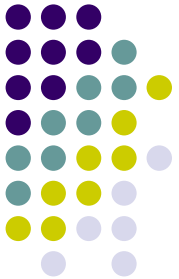
- Improved Quality of Care
- Internal Standardization for Data Consistency and Improved Communication
- Standardization to Meet External Regulations
- External Standardization to Support Communication Initiative

Vocabulary Services -Standards



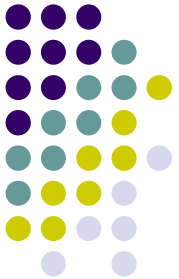
- Standards
  - **CHI standards – Intercommunication**
  - **caBIG where available**
  - **Purchase Vocabularies (prioritized list)**
  - **Extended Vocabularies with MDACC specific terms**
- Guiding Principles
  - **Prescriptive reuse**
  - **Service Level Agreements**
  - **Model Driven**

Vocabulary Services Governance



- Process …
  - **To govern our technology**
    - **to control at the project level**
    - **Centrally vetted vocabularies**
    - **Informaticians to reviewing new codes and align with external standardized vocabularies**
    - **Version control**
  - **To govern our data**
    - **System of record**
    - **Data Contracts**
    - **Model-Driven Integration**
    - **Standard vocabularies**
  - **To ensure prescriptive reusability**
    - **Service Level Agreements**
    - **Project intake process**

Vocabulary Services Strategy



- Develop a standardized vocabulary service
- Implement and manage national standard vocabularies
- Manage local vocabularies/ontologies, reduce duplicate vocabulary management
- Instantiation of a standards based terminology service utilizing the SOA framework for use by all domains
- Structured vocabularies to feed applications at the point of care, clinical research, basic science, and administrative applications.
- Populate ontologies that aid in decision support.

Vocabulary Services Roadmap

FY09	FY10	FY11	FY12
• Implement Standardized Vocabulary Service • Implement Governance Framework • Formalize Vocabulary Committee • Implement MDACC DSR/MDR • caBIG compliant from a terminology perspective	• Publish Vocabulary Services • Standards-based Ontology Pilot	• Vocabulary Services Fully Integrated with MDACC ESB as part of the SOA framework	• Develop MDACC Ontology Repository • Develop Message-Based Ontology & Decision Support Solutions • Terminology Service is HL7 CTS II Compliant • Implement SDO API's into Terminology Service

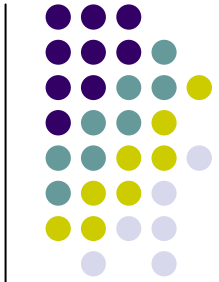
Data Modeling Goals and Motivators

- Reuse of data models lower development, support, training, and integration costs
- Creation of a common data dictionary to enable semantic interoperability
- Facilitates impact analysis of change to data structures thereby avoiding ‘costly’ mistakes
- Provides data lineage for information in the repository for auditing purposes (e.g. CMS, FDA, etc.)
- Reduce data duplication
- Improve communication by providing a common framework.

Data Modeling Strategy

- Identify and implement standards for data modeling and metadata management
- Reuse of data models lower development, support, training, and integration costs
- common data dictionary to enable semantic interoperability
- Identify and implement standards for data profiling and data quality
- Identify and implement a master data management program
- Incremental development of an industry standard based enterprise data model to facilitate semantic and syntactic data integration

Data Modeling Roadmap



FY09	FY10	FY11	FY12
• Identify / Implement Data Modeling, metadata management Tool & Standards • Incorporate these standards into MDACC SDLC • Select Industry Standard Reference Model • Implement Data Governance Framework • Conceptual/ Logical Model Development	• Develop Data Quality and Data Profiling Standards • Develop a Conceptual Enterprise Information Model • Map / Catalog Individual models to Industry Standard Model • Develop strategy for evolving Enterprise Logical Information Model	• Implement Data Quality/Profiling Tools • Develop Master Data Management Standards and Tools • Continue evolving Enterprise Logical Information model • Continue evolving Enterprise Domain Models	• Data modeling best practices /standards fully institutionalized and operational

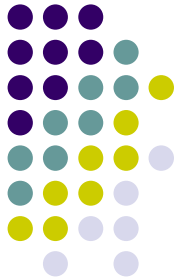
SOA Goals and Motivators

- Automated Business Processes
  - Better consistency
  - Message (event) based decision support
- Efficient Software Development Life Cycle (SDLC)
  - Reduced cost
  - Reduced redundancy
- Business Driven Governance
  - Better data for analysis
  - Better compliance
  - Streamlined business rules
  - Improved user experience

SOA Vision

- Service Identification Framework
  - Consider Services-Aware Enterprise Architecture Framework (SAEAF) for HL7
- Choreography Language
  - Avoid hard coding rules to handle sequencing and routing of analytics data
- Technology Agnostic Service Bus
  - Orchestration / business rules
  - Message based (event driven) decision support

SOA Roadmap



FY09	FY10	FY11	FY12
• Implement Governance Framework • Formalize SOA Committee • Build SOA Roadmap • Educate MDACC on SOA	• SOA Interface Definition For Vocabularies • Identify and Develop Common Services • Publish Vocabulary Services • Setup SOA Governance Organizations • TBD	• Enterprise Service Bus Available • TBD	• TBD

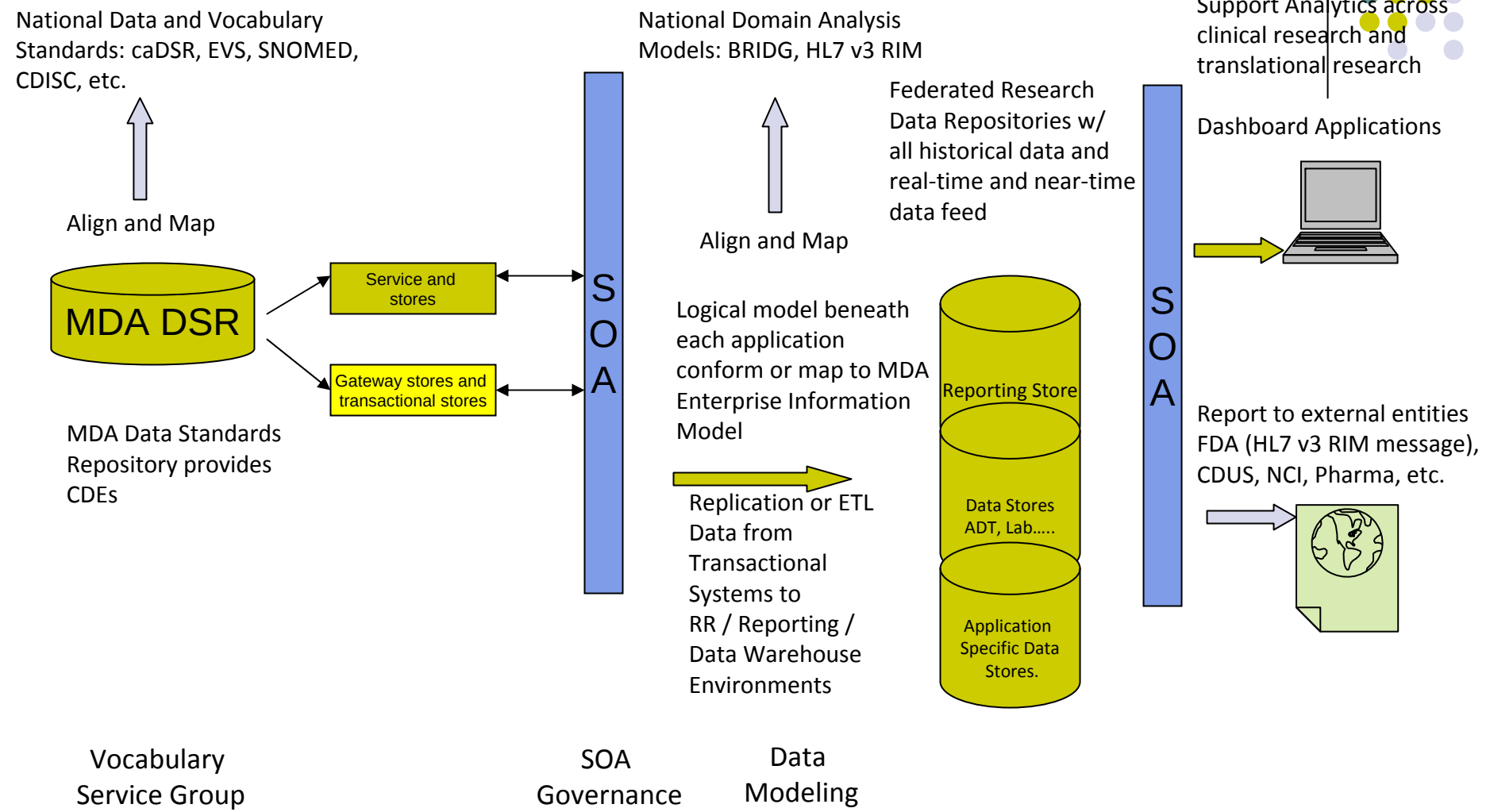
Aggregate Roadmap

FY09	FY10	FY11	FY12
• Build Roadmaps / Strategy • Implement Governance, Best Practices, Standards, and Tools • Incorporate standards into MDACC SDLC • Select Industry Standard Model • Conceptual/Logical Model Development • Implement Standardized Vocabulary Service and caDSR	• Identify, Develop, and Publish Common Services • Develop Data Quality and Data Profiling Standards • Develop a Conceptual Enterprise Information Model • Map / Catalog Individual models to Industry Standard Model • Develop strategy for evolving Enterprise Logical Information Model • Develop strategy for Master Data Management • Develop Enterprise Domain Models • Standards-based Ontology Pilot	• Implement Data Quality/Profiling Tools • Develop Master Data Mgt Standards and Tools • Continue evolving Enterprise Logical Information model • Continue evolving Enterprise Domain Models • Enterprise Service Bus Available • Vocabulary Services Fully Integrated with MDACC ESB • caBIG Compliant (Vocabulary Service in FY09, UML data models in FY10, and SOA API services compatible with GRID)	• Develop MDACC Ontology Repository • Develop Message-Based Ontology & Decision Support Solutions • Terminology Service is HL7 CTS II Compliant • Implement SDO API's into Terminology Service • Map Terminology to OWL • Data Modeling best practices/standards fully institutionalized and operational

Interconnectedness

A possible short list of our top 5 reasons for these projects	Vocab Services	Data Modeling	SOA Gov
1) Improve patient care, research processes and quality	X	X	X
2) Rapid response to regulatory mandates	X	X	X
3) Recycle use of IT investments	X	X	X
4) Minimize data entry redundancy	X	X	X
5) 360 degree view of information	X	X	X

MDA Data Integration Strategy

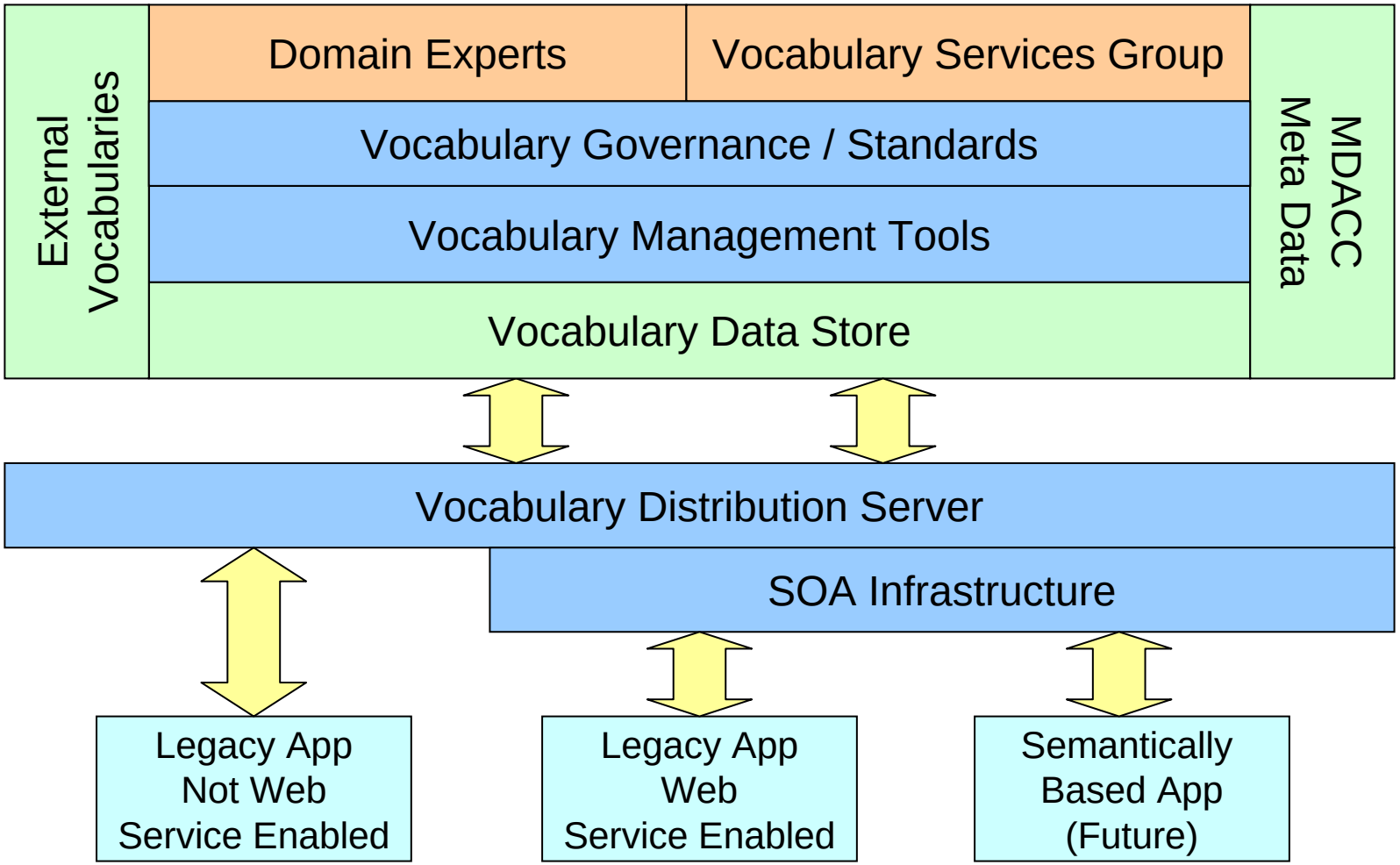


Vocabulary Service Group

SOA Governance

Data Modeling

How do we put it together
(conceptually)



Questions?

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