>Applied Technology Solutions, Inc.(ApTSi™)

Applying Technology to Business Problems™

Information Architecture and the Actionable Enterprise Architecture

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Introductions

ApTSi ™
Applied Technology Solutions, Inc.

- **Feb 4th, 2009**

Name	Title
Nikhil Kumar	President & CEO Co-Chair SOA Reference Architecture Project, The Open Group
Dinakar Sosale	Principal, Databases and BI
Tom Osberg	Lead Consultant, Strategy

- **Leadership**
- **World Class Technology**
- **Experience**

- **Strategy**
- **Integration & SOA**
- **Application Development & Reuse**
- **DB, EII & BI**

Nikhil Kumar President
Email: nikhil@ap-tech-solns.com
Blog: http://blogs.ittoolbox.com/emergingtech/nikhil
Phone: (248) 797 8143

Dinakar Sosale Principal, Databases and BI
Email: dsosale@ap-tech-solns.com
Phone: (240) 605 7208

Tom Osberg Lead Consultant, Strategy
Email: tosberg@ap-tech-solns.com

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Agenda

- What is Information Architecture
- Background
- Information Architecture in the modern context
- A reference model for Information Architecture
- The Information Lifecycle and Governance
- The Future and the present
- Patterns for Information Architecture
- The Business Case for Information Architecture
- Summary and Conclusions

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What is Information Architecture

Information Architecture (IA) is defined as the *architectural elements for the management of information* within an enterprise or organization/s

Data Architecture is defined as the *definition of data structures within a subject area or domain*

Information is a *combination of data, as well as descriptive elements (metadata) which define the role of data within the context of the Enterprise. It has a static and a runtime context.*

The modern concept of information as a service involves the virtualization and exposure of information across the enterprise. This includes physical exposure of the data in form of a service, as well as the availability of the metadata for associated systems and their repositories

Thus, for example, information in the context ofa Health Care Enterprise, for a patient record there would be the structure, the interoperability constraints, the lifecycle, the reliability of the data, the systems of record and the data lifecycle. The provision of a virtualized, inter-system view of a patient record, and the shareability of the data falls into the runtime element of information architecture – where we consider information as a service. In this aspect there are significant quality of service and interoperability attributes that need to be taken into consideration

In contrast, data in this context would be the data structure for the clinical system of a patient record – nothing more and nothing else

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Information Architecture & Data Architecture: The Difference

Information Architecture

1. Meta-data about “information”
2. Enterprise in scope
3. Requires an understanding of the business model
4. Requires an understanding of interoperability constraints
5. Addresses information lifecycle, quality of service, data quality, etc.
6. Addresses the provision of information as a service in an enterprise context
7. Deals with the persistence and transport of data
8. Has a significant implication in terms of governance
    1. Compliance
    2. Versioning
    3. Interoperability
    4. Data Reliability
    5. Data Quality
    6. Data Availability
9. Has a larger, Enterprise semantic (functional) perspective

Data Architecture

1. Project or system in scope
2. Focused on system requirements
    1. Interoperability at a system level
    2. Data Model is the vehicle for communication
3. Normally deals with persistence and not transport of data

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What is Information Architecture

Key elements of IA:

- Structural Aspect:
  - Enterprise Domain Model (Canonical Form)
    - Enterprise Attributes
    - System Level Attributes
- Meta-data about data
  - Source of truth assignment (in practice most data comes across systems from different sources of truth in an Enterprise perspective)
  - Temporal reliability (when the data is available)
  - Data Quality
  - Data Reliability
  - Enterprise Data Semantics (what does an attribute mean in terms of the assertion of enterprise business rules)

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What is Information Architecture

Key elements of IA:

- Governance
  - Structural – ownership of data and decision rights
  - Process
  - Strategic – changes in information architecture have a lot of impact
    - Granularity in the canonical form is directly tied to agility
  - Compliance
  - Information Lifecycle

- Information as a service
  - Data as Information
    - Virtualization
    - Data retrieval as opposed to persistence
    - Data persistence of key data elements
  - Information as a shared resource (metadata)
    - Unified view of metadata
    - Interoperability and semantic exchange

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Background

- Background
  - The future modern delivery architectures
  - Drivers for the greater importance of information architecture today

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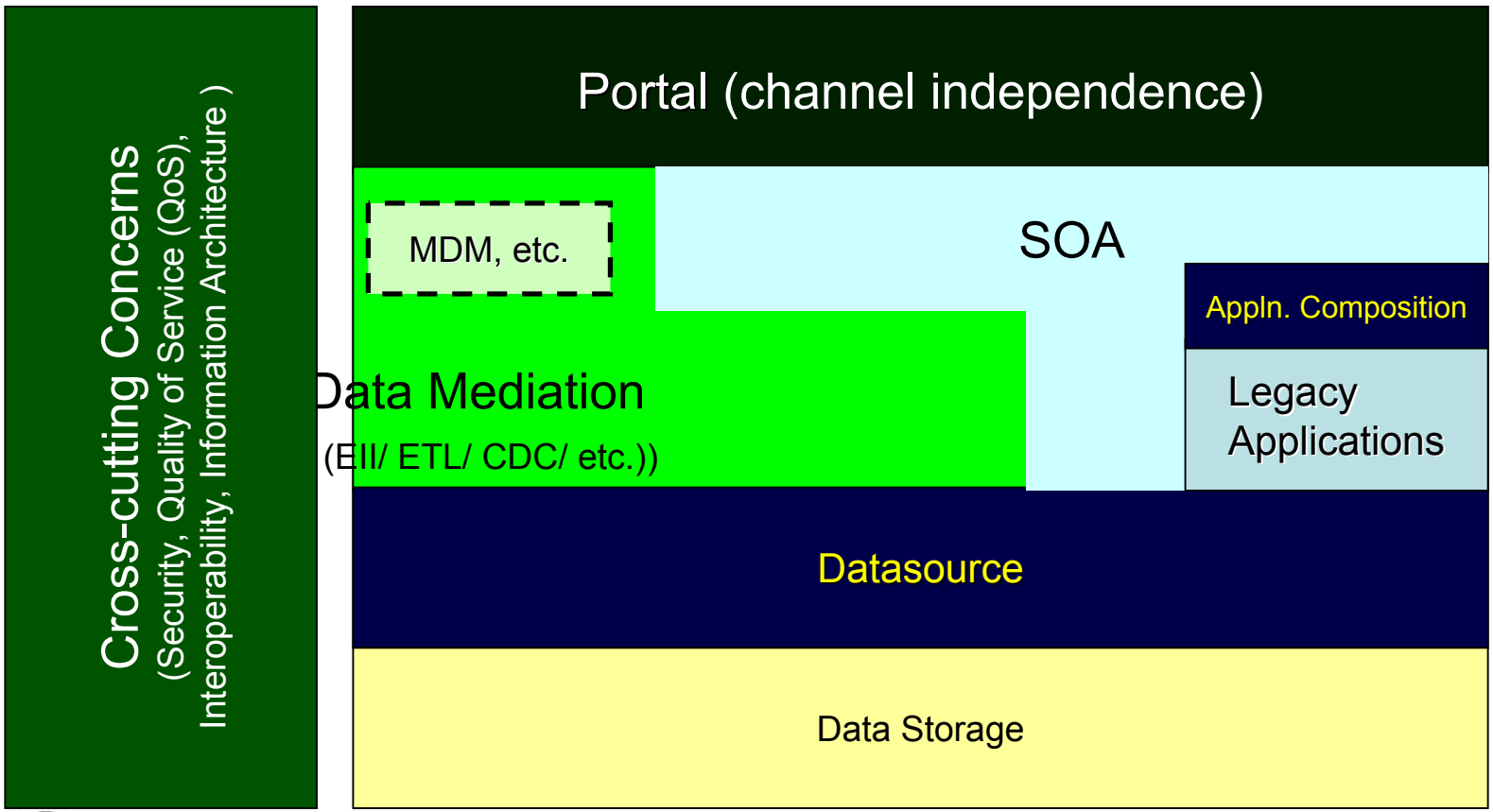
Future State "Actionable Architecture ™ Reference Model: Deployment Layers in the Runtime

The **Actionable Architecture ™** of the future will support a channel independent structure that will support varying sources of data, drive unified data views, be interoperable and service oriented and apply application composition to wrap legacy solutions into future state services .



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Background: drivers for information architecture

- Business Drivers
  - Shareable information
    - Modern organizations need to share information between business units
      - Issues are typically driven by
        - » The variety of information
        - » Differences in interpretation of that information in different organizational units
        - » Differing, system silos
        - » Varying information asset lifecycles
        - » Difficulty in correlation and mapping
        - » Temporal and quality differences (is the data trustable)
        - » Structural differences

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Background: drivers for information architecture

- IT drivers
  - SOA
    - Service interaction
    - Data transport
    - Lifecycle of information (and Risk factors)
    - Semantic Interoperability
  - MDM and CDI
  - Traditional drivers
    - BI and DW
  - Consumers of Information Architecture

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Why Information Architecture is so important today

- There is a significant increase in the number of data sources
- This increase has led to an enormous increase in the number of structured and unstructured data sources
- Irrespective of the industry you are in, there is the need for interoperability and increased detailed data content
- We also need to be able to easily introspect on the data and carry out analysis and take decisions on the data content
- Because of all these drivers, we need to be able to introspect on data in 3 fashions
  - Syntactically – which means we should be able to share physical data records. Data structures are interoperable.
    - This is implemented through common data structural formats such as canonical forms
  - Semantically – which means we must be able to *interpret* the data from 2 systems the same way. This is targeted at the manner in which data structures are interpreted
    - UDEF is an evolving standard that provides a model to implement this
  - Behaviorally – there is a need for data to behave the same way across systems. This requires a greater richness as there are rules associated with data structure.
    - RDF and OWL provide the requisite richness and are relatively mature though overall adoption has not been as extensive.
- This Information Architecture Reference Model applies to all tiers in the future Actionable Foundation Architecture, encompassing data sharing across SOA, Portal and Enterprise Information

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- Information Architecture in the modern context
  - The Centrality of Information Architecture
  - EA, SOA, Information Services and Data Services
  - MDM and 360 degree view of IA

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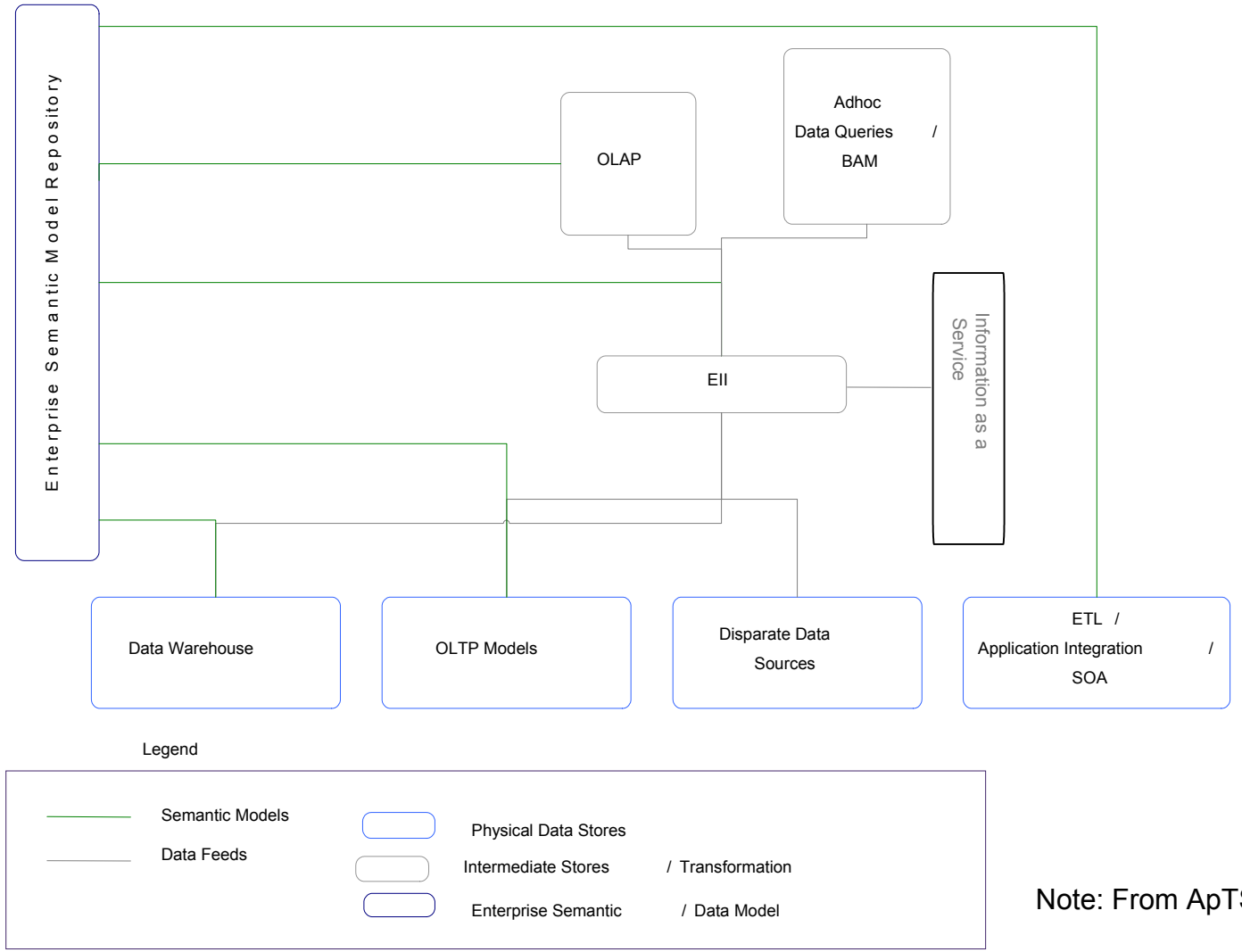
The Centrality of Information Architecture



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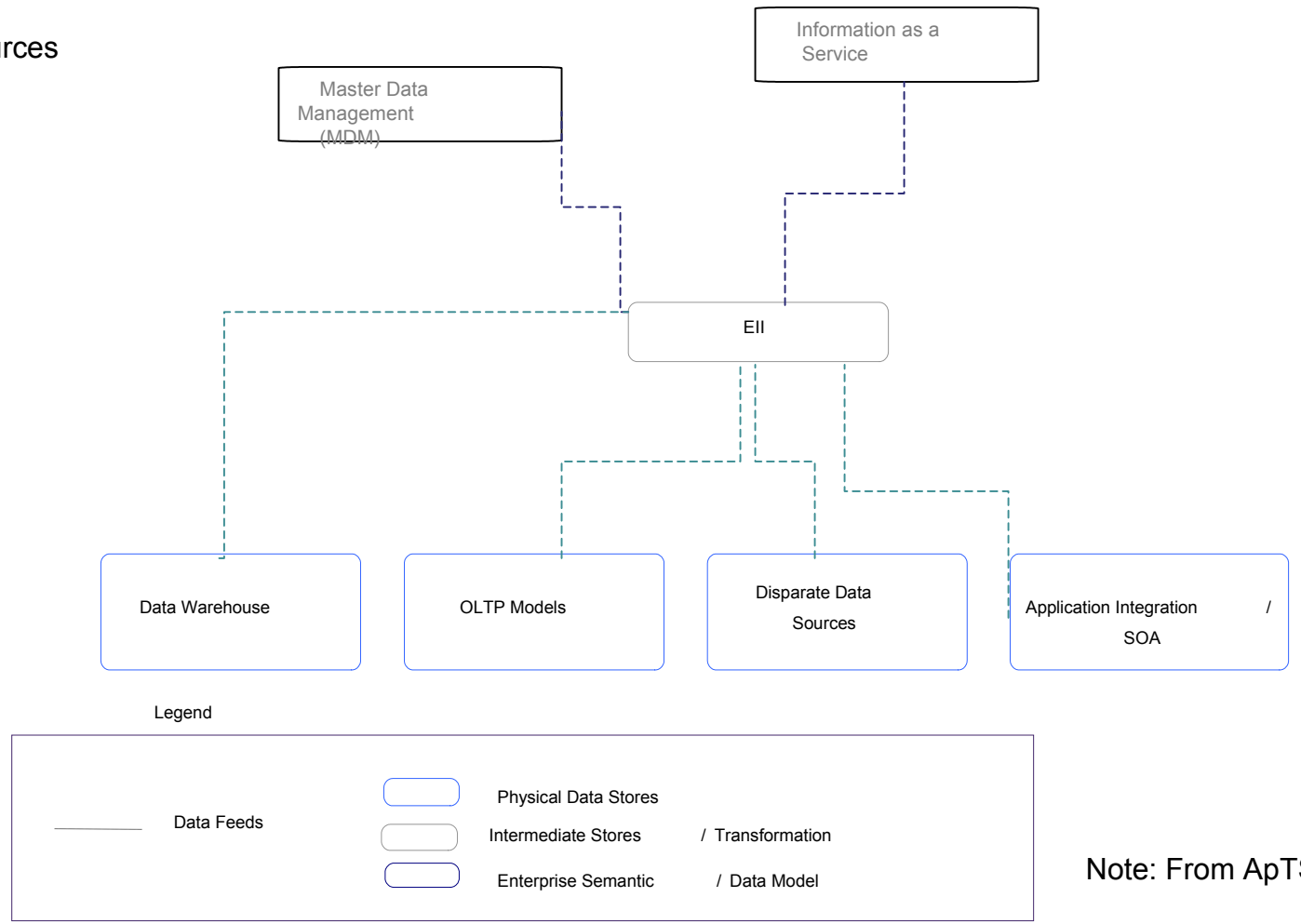
The Centrality of Information Architecture

The Modern Context:

IA, MDM, Data Sources



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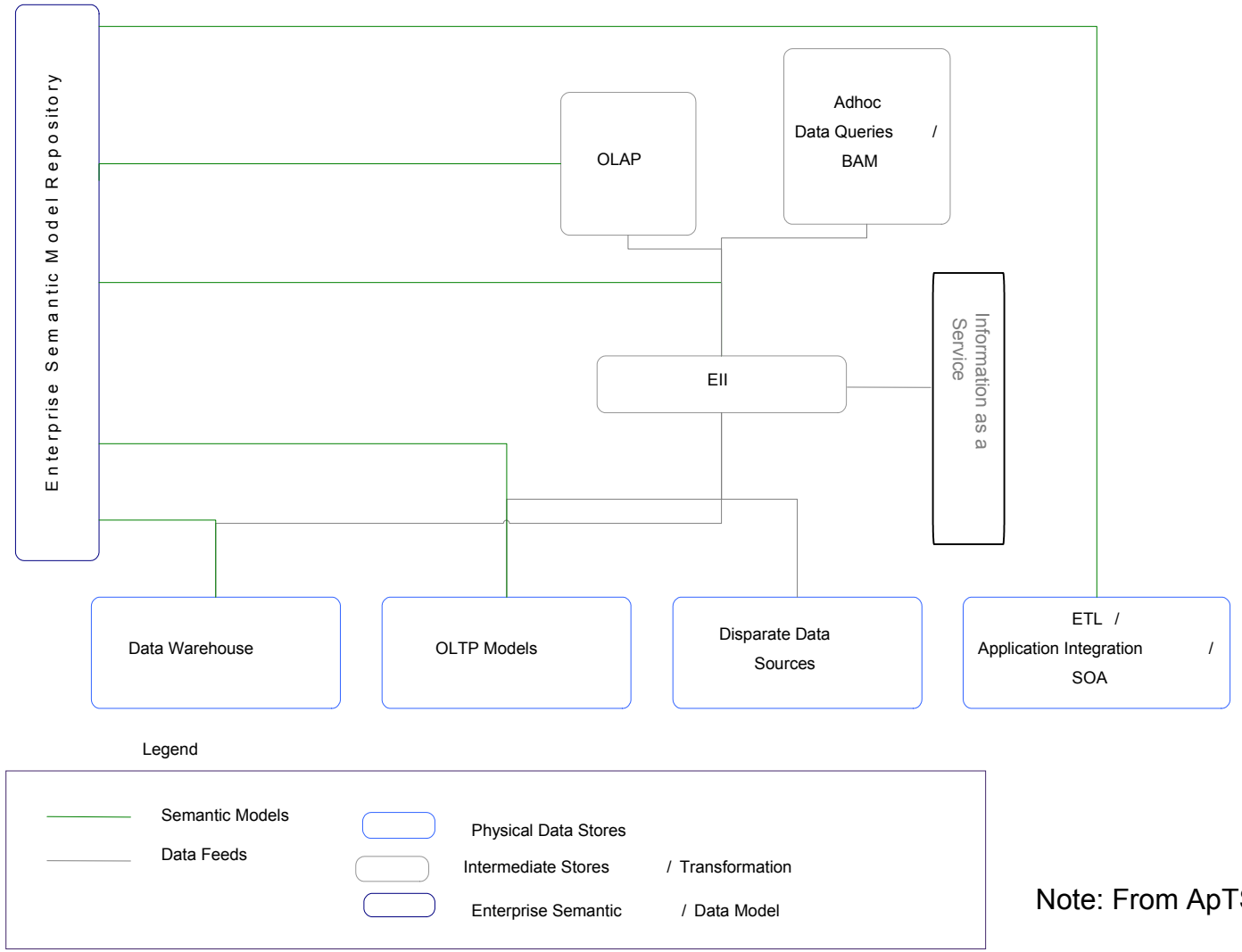
The Centrality of Information Architecture: elements of interaction



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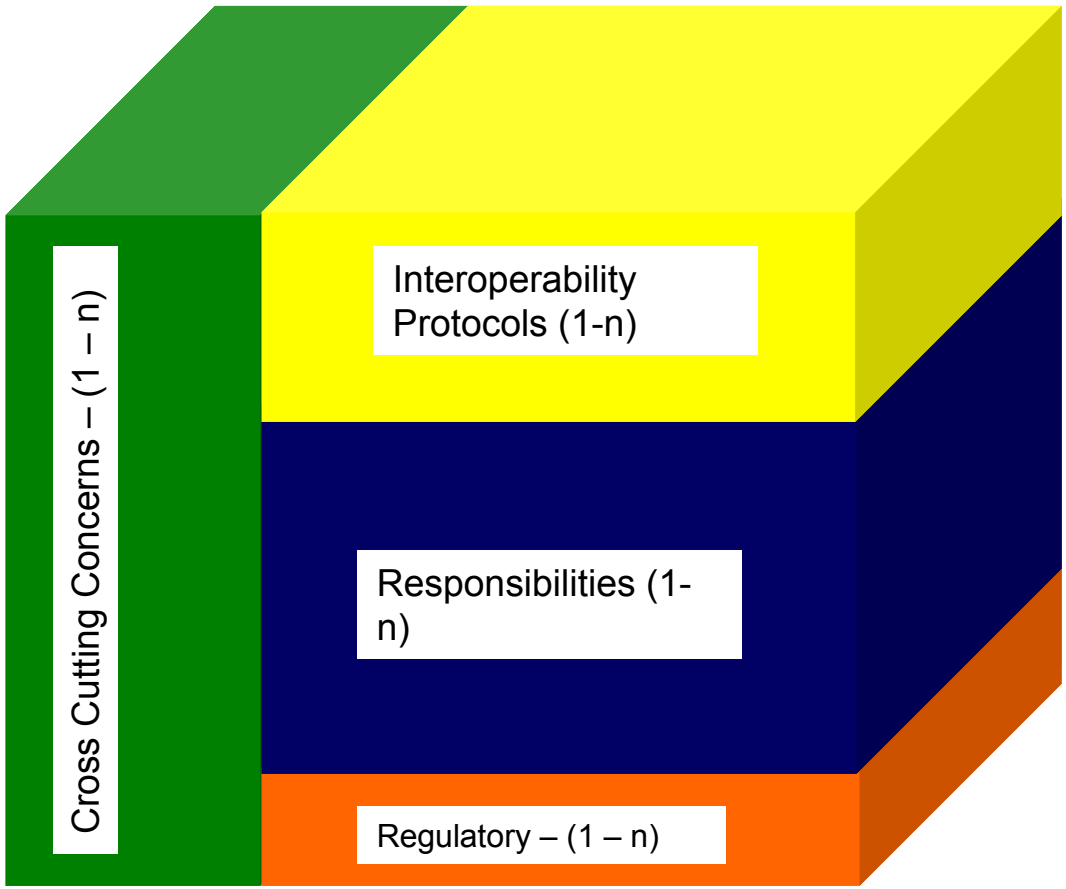
The ApTSi perspective: The Architectural Building Block



An architectural building block of a Reference Model

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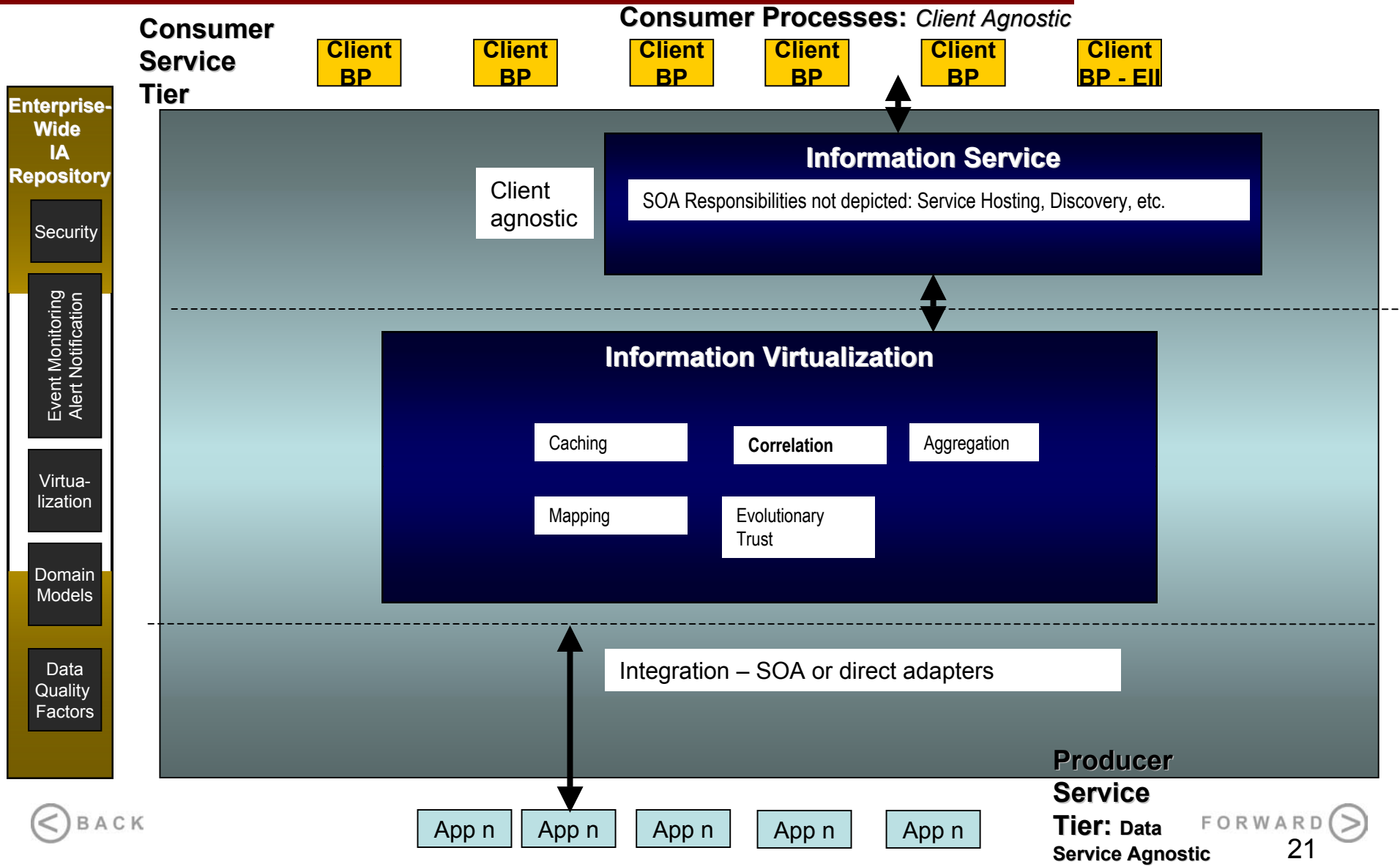
Information Architecture Reference Model



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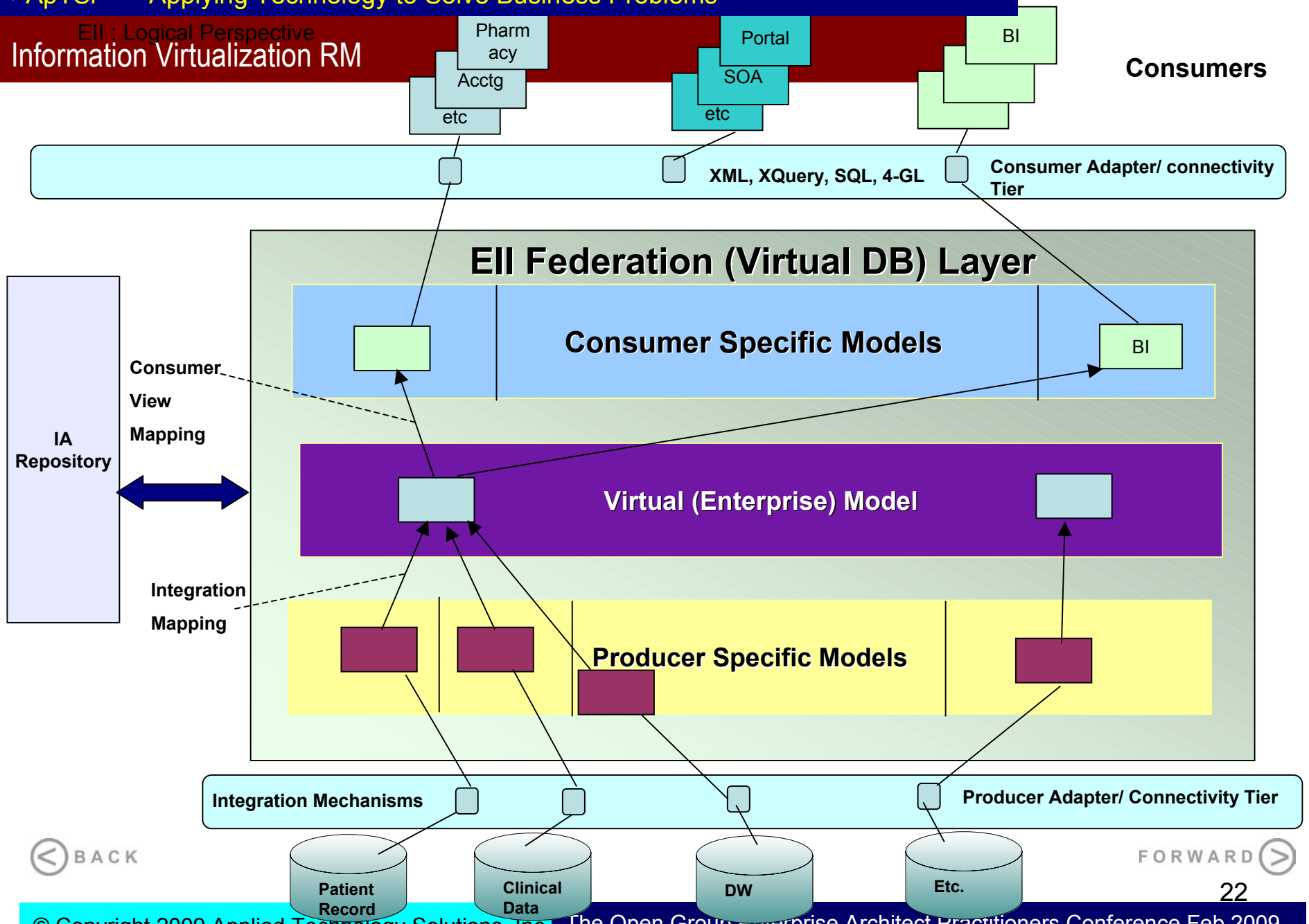
EII : Logical Perspective

Information Virtualization RM



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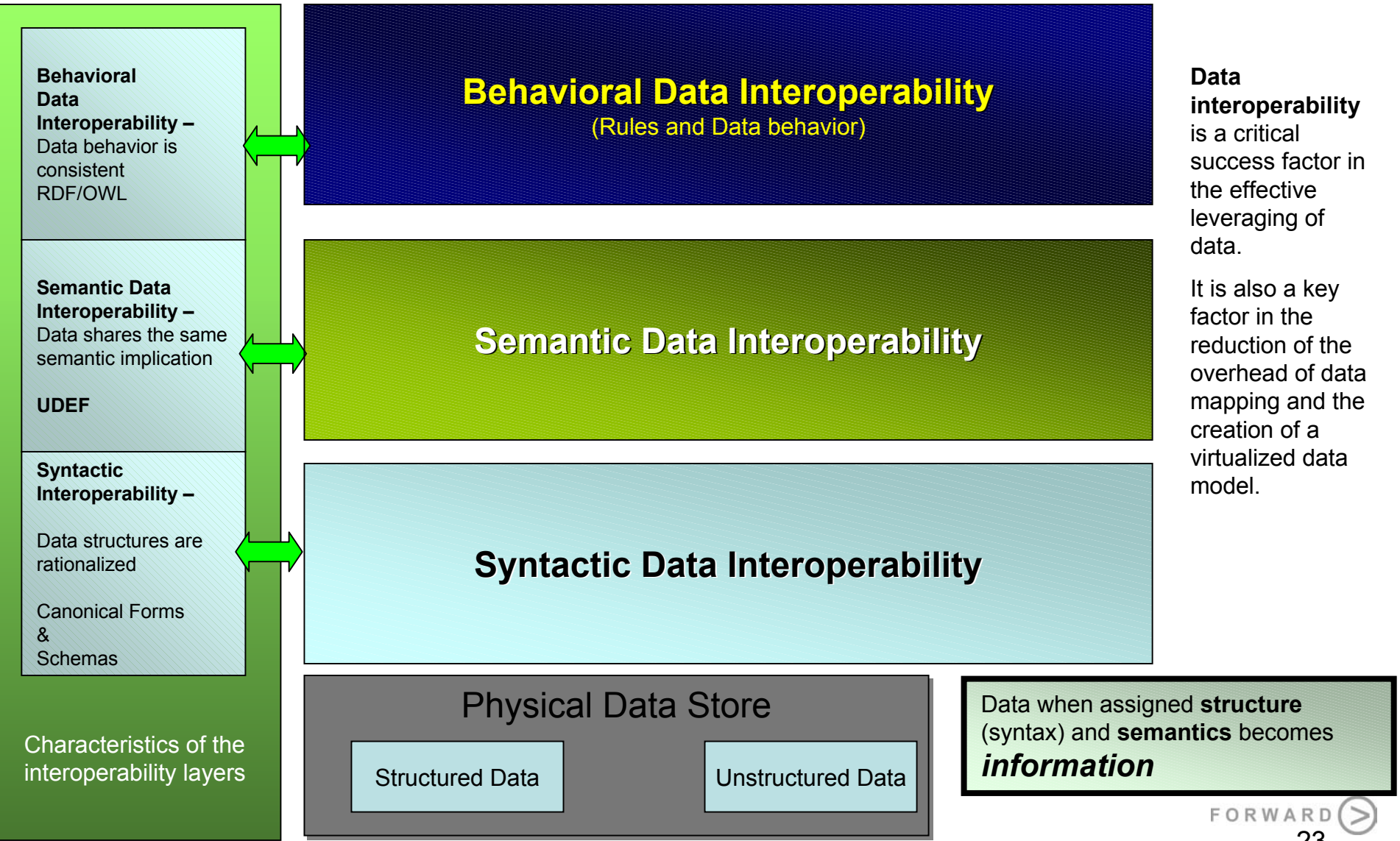
Interoperability Reference Model



Data interoperability is a critical success factor in the effective leveraging of data.

It is also a key factor in the reduction of the overhead of data mapping and the creation of a virtualized data model.

Data when assigned **structure** (syntax) and **semantics** becomes ***information***

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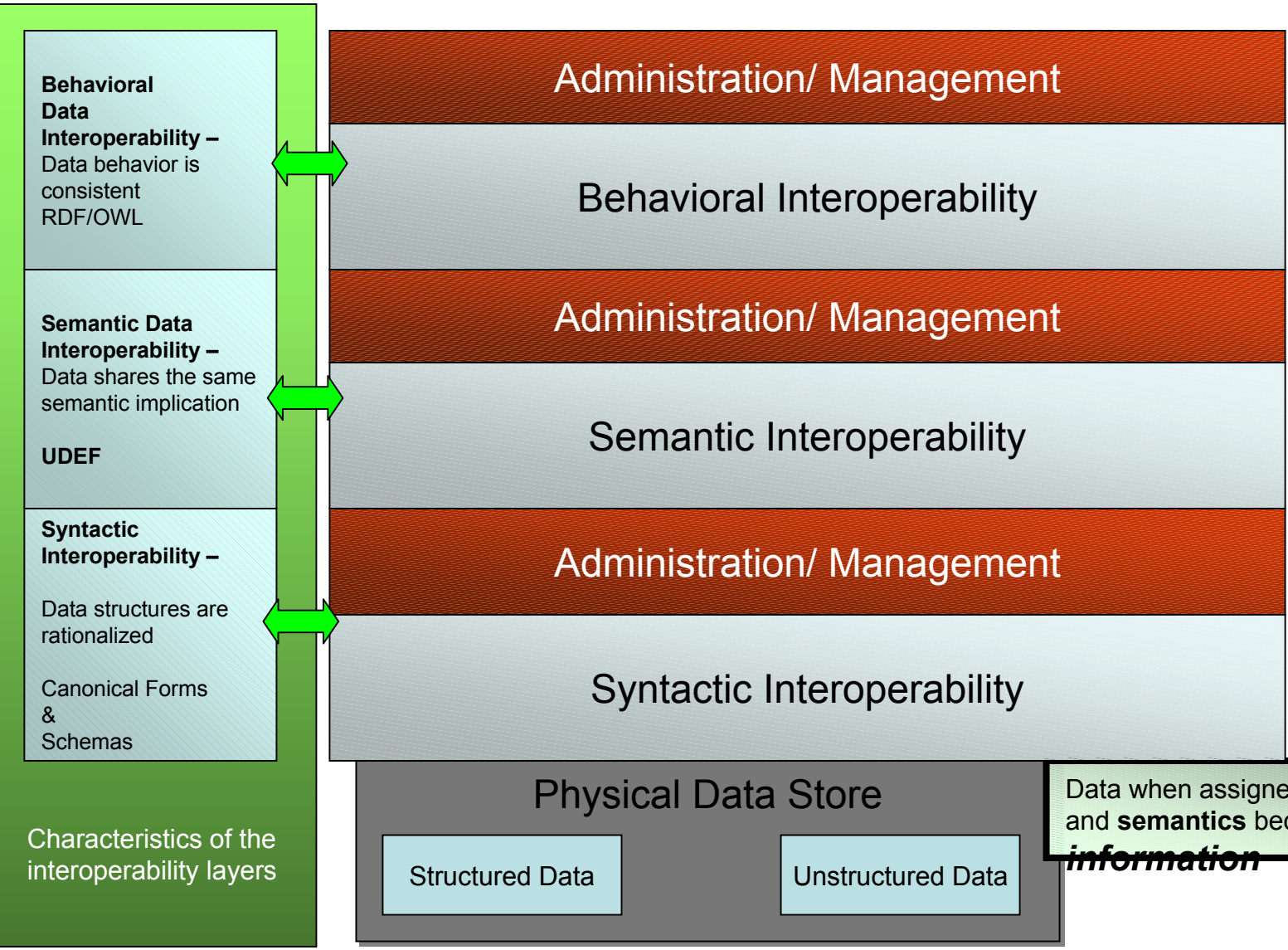
Interoperability Reference Model



Data interoperability mediation involves interoperability between the metadata standards – otherwise a metadata impedance mismatch will evolve

Data interoperability Metadata

Must be able to incorporate cross-cutting concerns for data description and a robust standard

Data when assigned **structure** (syntax) and **semantics** becomes ***information***

FORWARD

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Information Lifecycle and Governance

Key elements of the Information Lifecycle:

- Governance
  - Structural – ownership of data and decision rights
  - Process
  - Strategic – changes in information architecture have a lot of impact
    - Granularity in the canonical form is directly tied to agility
  - Compliance
  - Information Lifecycle

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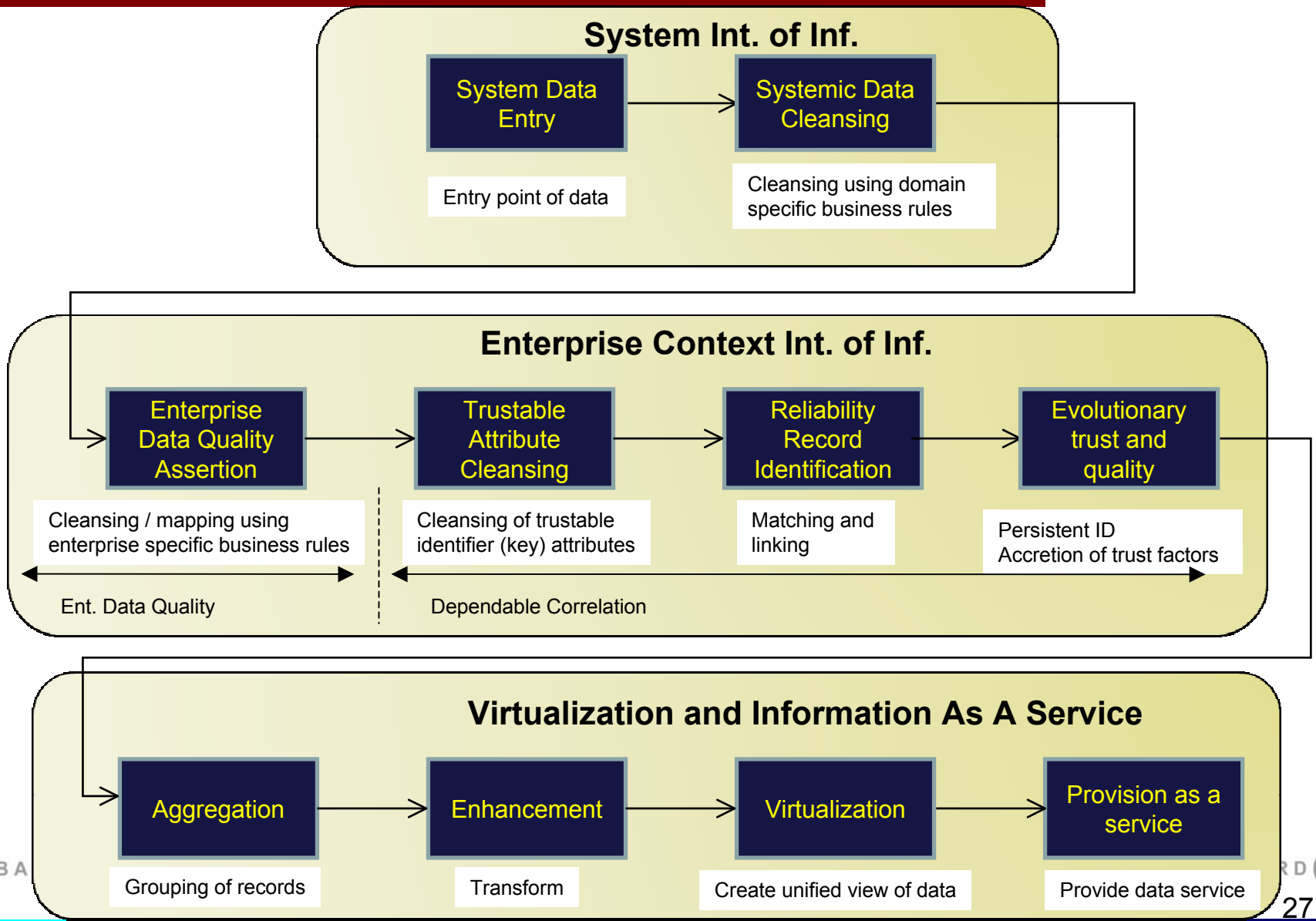
Information Lifecycle



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Information Lifecycle and Governance

Key elements of IA Governance:

- Governance
  - Structural – ownership of data and decision rights
  - Process
  - Strategic – changes in information architecture have a lot of impact
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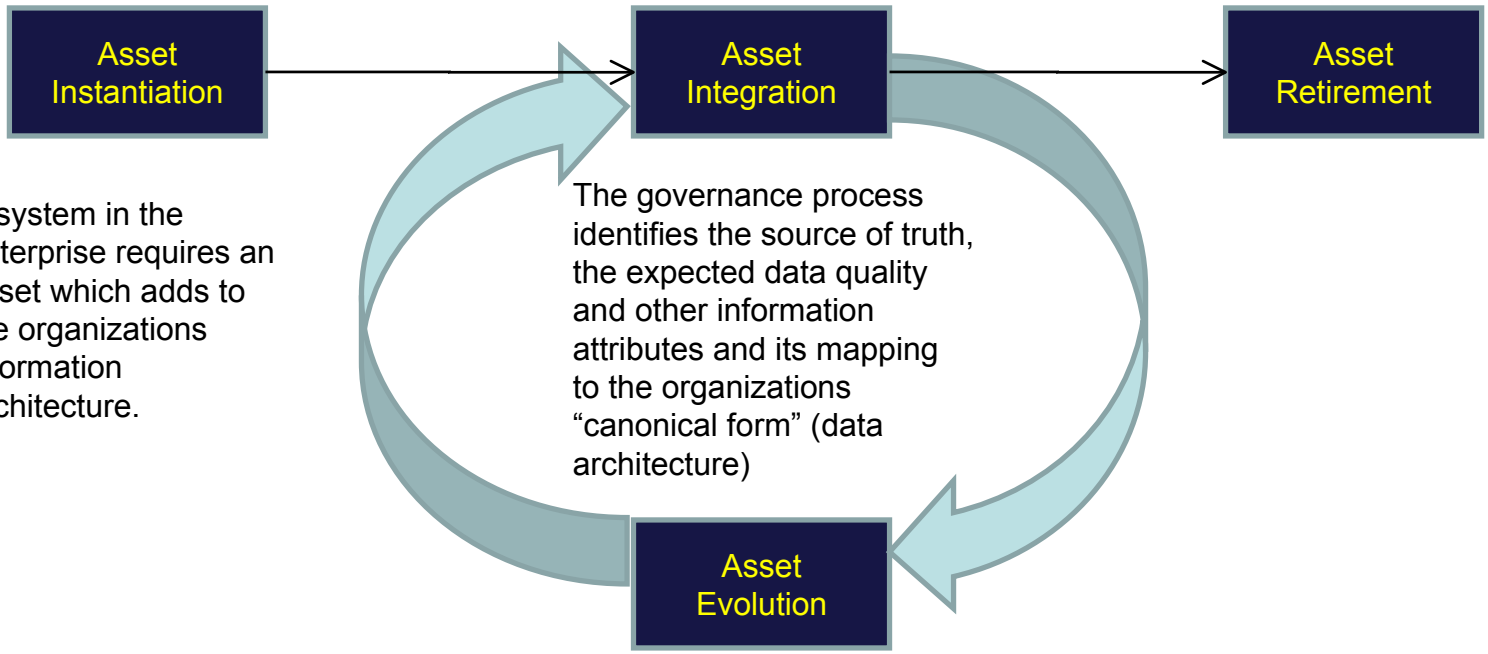
Information Lifecycle

The information architecture asset now added to the asset model



A system in the enterprise requires an asset which adds to the organizations information architecture.

The governance process identifies the source of truth, the expected data quality and other information attributes and its mapping to the organizations "canonical form" (data architecture)

Legend:

The dotted lines represent future advances not covered in this presentation

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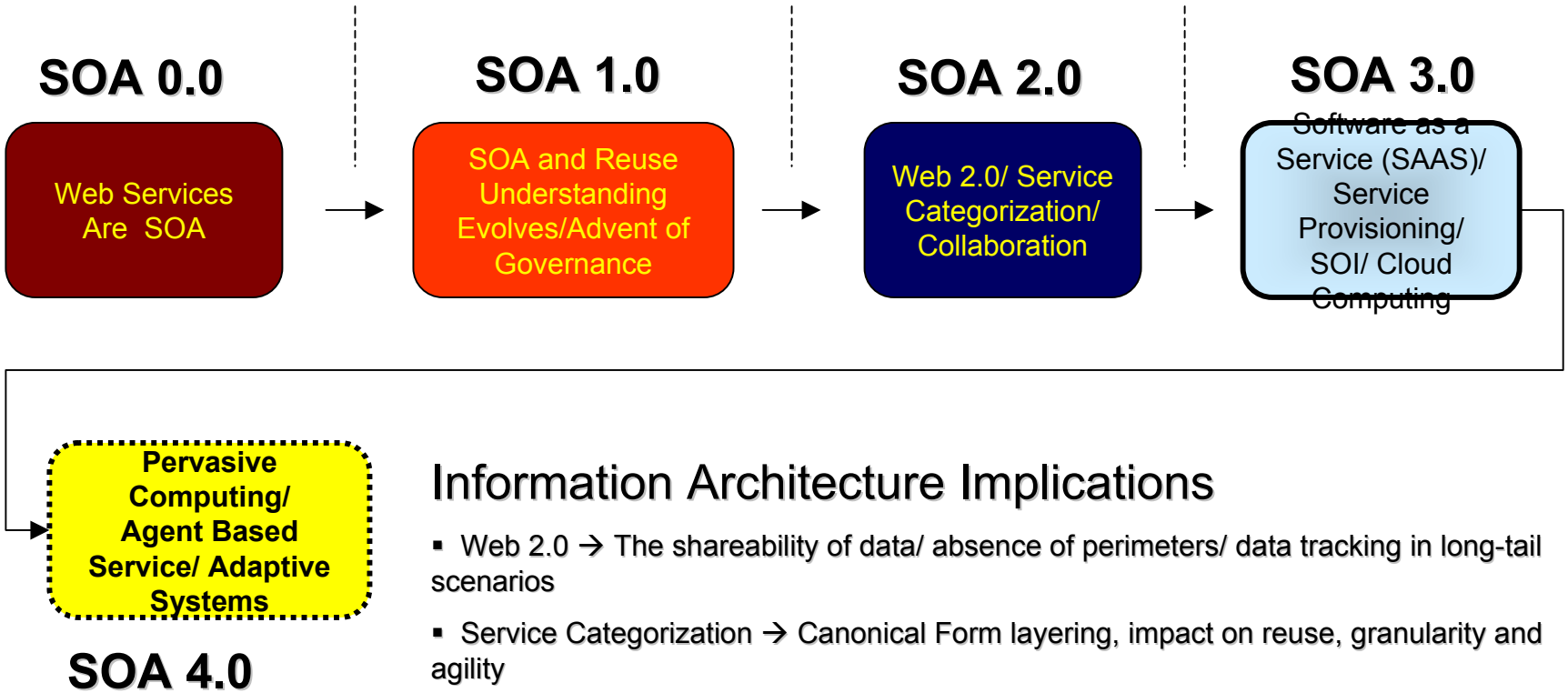
SOA Evolution



Information Architecture Implications

- Web 2.0 → The shareability of data/ absence of perimeters/ data tracking in long-tail scenarios
- Service Categorization → Canonical Form layering, impact on reuse, granularity and agility
- Collaboration → the creation of composed and orchestrated solutions
- SAAS → Interoperability, Security and Compliance, QoS and Temporal differences, Coupling and dependencies
- SOI → Data Integrity, Interoperability impact of platforms and SOI solutions
- Cloud Computing → Portability, vendor independence, scalability, QoS and governance, security, compliance

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The Terminology

‘ When I use a word’, Humpty Dumpty said, in a rather scornful tone, ‘it means just what I choose it to mean – neither more nor less.’

‘The question is’, said Alice, ’whether you ***can*** make words mean so many different things.’

•*Lewis Caroll “Through the looking glass”*

What is a pattern

A pattern is a general repeatable solution to a commonly occurring problem. Well known pattern sets include Fowler (Analysis Patterns and Enterprise Architecture Patterns) and the GoF

What is a pattern language

A pattern language is a set of patterns associated together in a particular sequence to address a particular problem. Examples are the J2EE Blueprints and the Microsoft EA Patterns

Why patterns and pattern languages?

Software engineering and design is about dealing with complexity. *As SOA goes mainstream, there needs to be a unifying collection of patterns and a pattern language that can be adopted and used across the industry, to act as the basis for a common language that SOA implementers can adopt..* It must go beyond the mere encapsulation of technical detail and provide a more holistic ability to address the complexities and greater scope of SOA, as opposed to say the J2EE blueprints.

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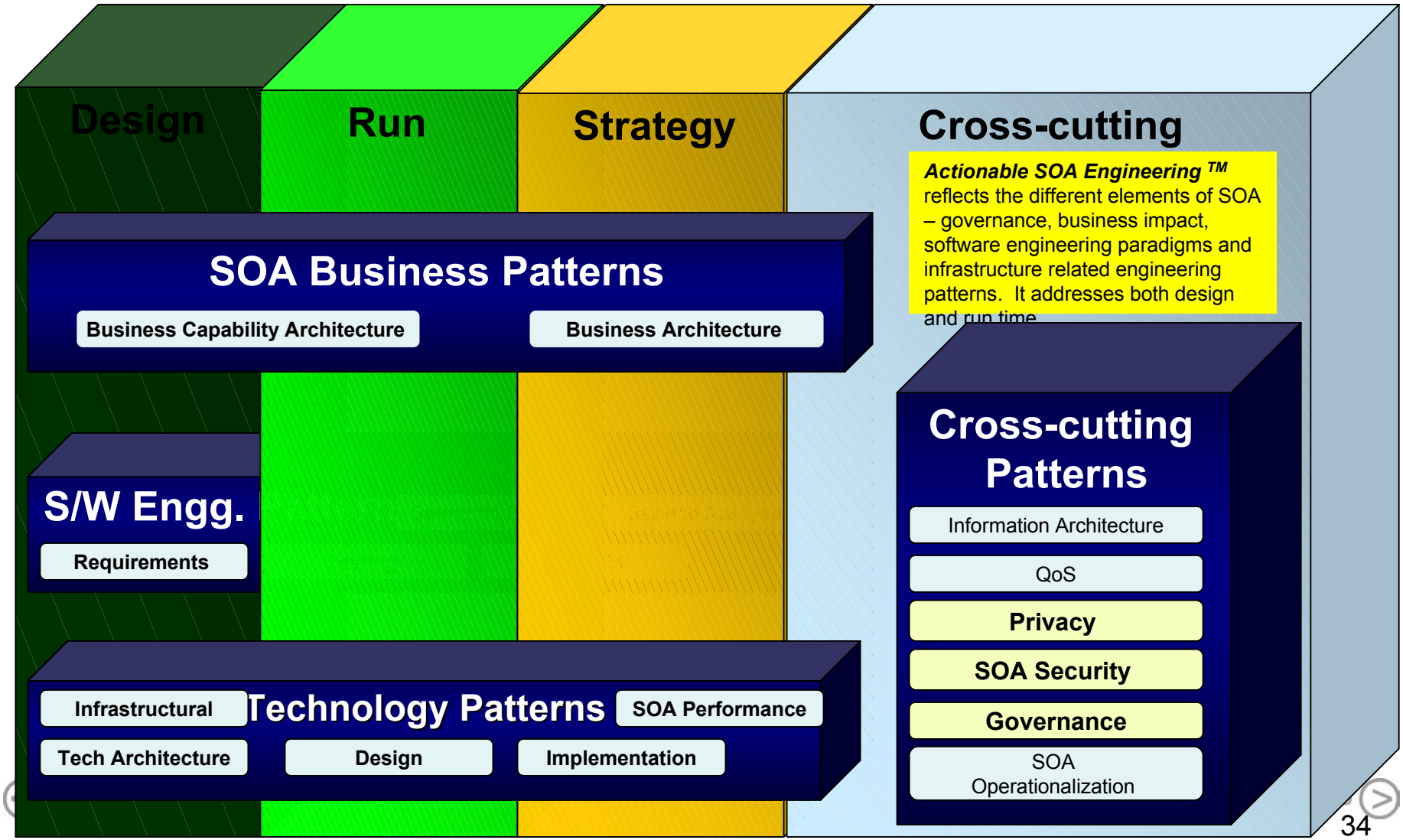
Patterns for Information

Actionable SOA Patterns™: The *Actionable SOA Engineering™ Continuum*



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The Patterns Taxonomy: Cross-cutting patterns and Information Architecture

SOA Cross-Cutting Patterns

What are SOA Cross-Cutting Patterns?

One of the key attributes of the future is that we are going to have even more, potentially non-standard service providers (applications) – COTS, legacy, new, etc. Cross-cutting patterns technical capabilities provide a mechanism to separate and isolate specific cross cutting concerns. Most of the cross-cutting concerns involve a special skillset. They are also going to be extremely critical in dealing with the information overload that the myriad of sources will definitely build.

In this section we are going to "lump" the set together

Information Architecture Patterns:

Information Architecture deals with 3 key elements:

1. Syntactical interoperability – we can translate what we mean
2. Semantic Interoperability – we can understand what we translated
3. Dynamic Application Capability – we can take the data that we understand and have an ability to plug it into a dynamic delivery capability to take Just In Time decisions

Key Patterns: Single Vision Multiple Perspectives, Conceptual is different from Logical which is different from Physical, Data will be virtualized, Semantic Content Includes Interoperability and rules, Incremental Implementation,

Some Antipatterns include the Unified Turing Information Architecture, Information Architecture is the Data

Architecture

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- The Business Case for Information Architecture
  - Cost Models – information architecture saves money by reuse, reduction of redundant data and communication / single vocabulary
  - Increased number of data sources
  - Data Quality
  - Risk Management
  - Agility
  - Sales and marketing
  - Turn cost into opportunity – examples from the banking industry and auto industry (TREAD act)

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Information Architecture and the Actionable Enterprise Architecture

What we have covered

1.Background and Understanding
2.Drivers
3.Reference Models
4.Information Lifecycle and Governance
5.Overview of Patterns

Not Covered
1.Cultural Issues
2.Cross Cutting concerns by providing a model to separate and apply them
3.Pattern Details
4.More Governance, MDM and CDI
5.TOGAF and Information Architecture

Thank you!

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Thank you!

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- **Feb 4th, 2009**

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- **Strategy**
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Nikhil Kumar President & CEO
Email: nikhil@ap-tech-solns.com
Blog: http://blogs.ittoolbox.com/emergingtech/nikhil
Phone: (248) 797 8143

Dinakar Sosale Principal, Databases and BI
Email: dsosale@ap-tech-solns.com
Phone: (240) 605 7208

Tom Osberg Lead Consultant, Strategy
Email: tosberg@ap-tech-solns.com

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Considerations for Information Architecture

FACTORS INFLUENCING ACTIONABLE INFORMATION ARCHITECTURES:

1. Metadata Management
   - Tooling and Governance
   - Agile Metadata Creation Capabilities
   - Efficient Maintainability
   - Vehicle for clear communications of semantic details
2. Cross Cutting Concern Support
   1. Security
      - Secured access to data repositories
      - Information architecture to support levels of access for data elements (tables)
      - Encrypted data channels
      - Dynamic secure communications setup to support managed services – methods for SCP/SFTP communications on the fly?
   2. Compliance
      - Data retentively and storage
      - Access control
      - Audit and logging
3. Data Grid Architecture and Virtualization Support (GGF10 Data Services Grid)

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Considerations for Information Architecture

4. System Considerations
   - Data Availability and SLAs
   - Efficient handling of large volumes of data
   - Efficient handling for large volumes of transactions
   - Warehousing to support agile transformation requirements
5. Information Delivery and Inter-operability
   - Information discovery support for SOA
   - Service contract governance
   - EII support for intra-enterprise information exchange
   - XML and non-XML data support

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