SNIA

Education

Classification: The Cornerstone for Compliance and Cost-driven Information Management

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Abstract

Classification: the cornerstone for Compliance- and Cost-driven Information Management

Without a clear understanding of all the information under management in your environment, it is impossible to get a handle on information growth, compliance-related risk mitigation and information management costs. The practice of information classification is fundamental to an effective information-centric ILM strategy. Information classification requires that I.T. administrators work with Line-of-Business and knowledge workers to gain an understanding of the data to be managed. Once a clear set of goals and policies are established you can efficiently organize your information into tiers of service that will meet the performance, protection, and compliance requirements of your business.

This session will explore the different types of classification methodologies and techniques used to drive data placement and service delivery today, and how that relates to the delivery of a multi-tiered service catalog.

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About SNIA and the DMF

About the Storage Networking Industry Association (SNIA)

- SNIA's primary goal is to ensure that storage networks become complete and trusted solutions across the IT community
- For additional information about SNIA see www.snia.org
- SNIA's "Dictionary of Storage Networking Terminology" is online at www.snia.org/dictionary

About the Data Management Forum (DMF)

- Founded in 2004, the Data Management Forum is a sub-group of SNIA specializing in data management and protection throughout the lifecycle of information.
- More information about the DMF including resources on data and information lifecycle management can be found at www.snia-dmf.org

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Agenda

1. Introduction
2. Classification
3. Service Level Management
4. Automating Policy Management

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What's Driving The Need for Classification *TODAY*

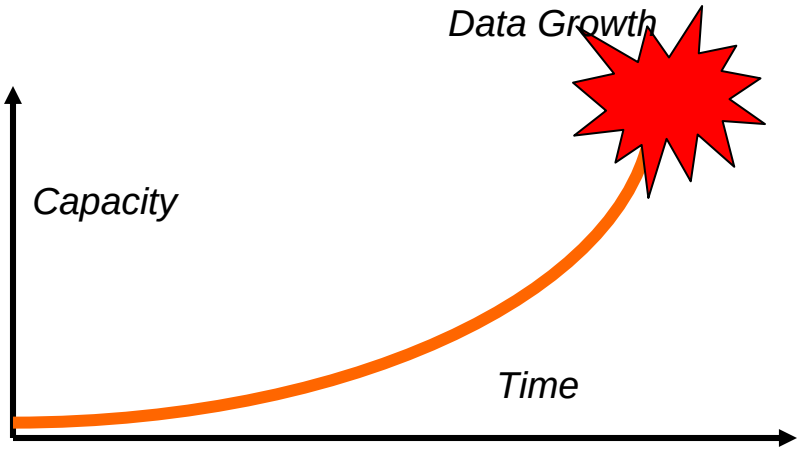
Corporations are *saving everything*, because

- They are unsure about the value of their information
- They are being litigated
- They are complying with government regulations

Resulting in

- Massive amounts of information growing at fantastic rates
- Information security breaches
- Lots of money being spent for governance and compliance

Corporations are balancing *IT Infrastructure and Management Costs* against *Information Risk Management*



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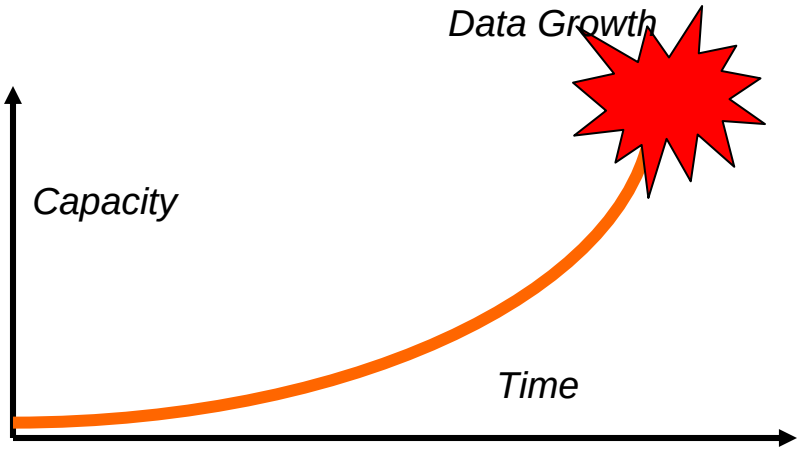
3 drivers for automated classification:

1. **Risk Management**
2. **Reduce Storage TCO**
3. **Improve Productivity**



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Classification Driver #1

Risk management

- Compliance:
  - Payment Card Industry Data Security Standard (**PCI**)
  - Health Insurance Portability and Accountability Act (**HIPAA**)
  - New Federal Rules of Civil Procedure (**FRCP**)
  - EU Directive on Privacy and Electronic Communications (2002/58/EC)
- Information Security
  - Protecting Personally Identifiable Information (**PII**)
  - Data Leakage Prevention (**DLP**)

- *$80B spent on compliance by 2009*
- *Compliant records growing 60%/yr at > 2PB in 2007*
- *Fastest growing application segment of storage industry*

Top 10 Customer Data-Loss Incidents Since 2000*

Company / Organization	Number of affected customers	Date of initial disclosure
TJX Companies	45,700,000	Jan 17, 2007
Visa, CardSystems, Mastercard, AMX	40,000,000	June 19, 2005
America Online	30,000,000	June 24, 2004
US Dept Veterans Affairs	26,500,000	May 22, 2006
Dai Nippon Printing Co	8,637,405	March 12, 2007
Data Processors Inter.	5,000,000	March 6, 2003
KDDI	4,000,000	June 13, 2006
Citigroup, UPS	3,900,000	June 6, 2005
Georgia Dept Com Health	2,900,000	April 10, 2007
Chase Card Services	2,500,000	Sept 7, 2006

* Source: Fred Moore, Horison, Storage Spectrum 2006

*From http://etiolated.org/ July 3, 2007

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Litigation Support and eDiscovery

- eDiscovery and records management coming together
  - Driven by huge costs and risks
  - Changes to the Federal Rules of Civil Procedure
    - Electronically Stored Information (**ESI**) is subject to production (the way it is managed from cradle to grave will impact costs and risks of eDiscovery)
    - There will be an early "**meet and confer**"
    - Word "**preserving"** appears in the rules for the first time
    - There is a need to understand the "**sources**" of ESI
  - Average eDiscovery costs can run into the millions of dollars per event

Check out SNIA Tutorial:

How E-Discovery Will Impact
Your Life as a Storage Professional

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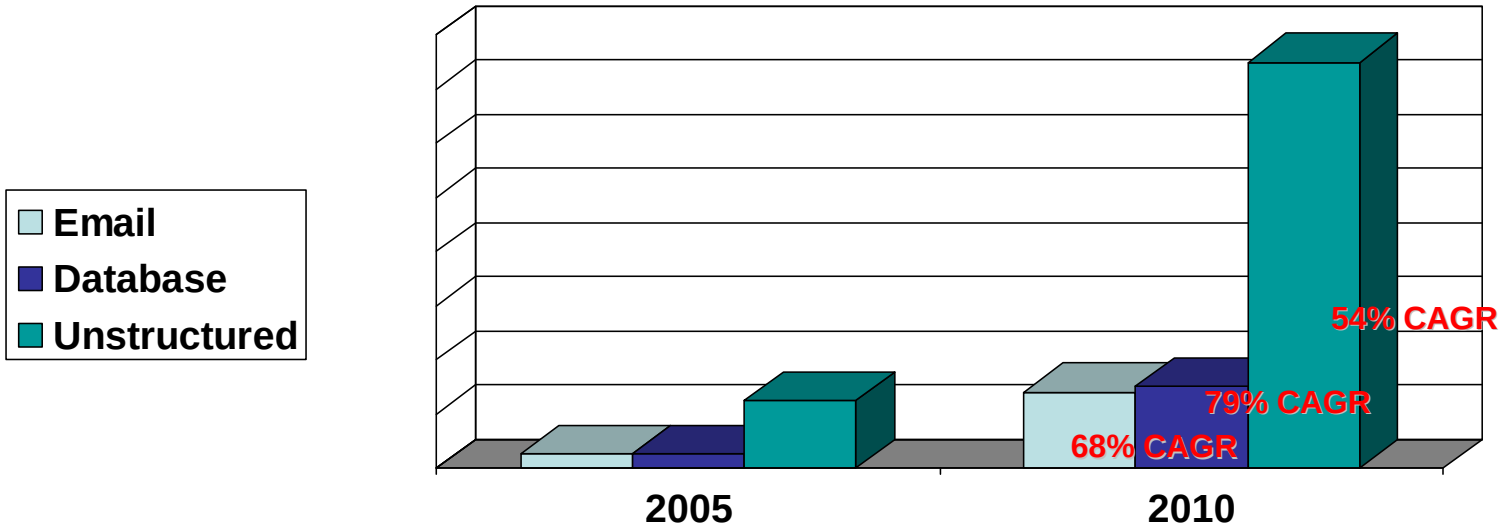
Classification Driver #2

Storage TCO

- External disk storage purchase projected to grow at 52% annually
- Capacity is #1 storage issued driven by email, unstructured data
- Significant transition to disk-based archival storage
- Digital archive capacity will increase nearly tenfold between 2005 and 2010

Total Digital Archived Capacity,WW



* Sources: Merrill Lynch 2007-08 storage forecast & views from CIOs, Enterprise Strategy Groups 2006 Digital Archive study

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Classification Driver #3

Improved productivity

- The average knowledge worker spends *six hours per week* searching for information
  - 50% of all searches fail to locate desired information
  - 15% of the average knowledge worker's time is spent recreating existing information
- Need
  - Better organization of information
  - Accurate search
  - Consistent management of information
  - Shortened "time-to-information"

Source: IDC

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Classification

Classification, Taxonomy & Ontology

- Classification:
  - Organizing entities in groups for management purpose
  - Generic term can be applied across many levels of implementation
- Taxonomy:
  - Classification based on concepts or syntax
  - Tree – single inheritance
  - Strong taxonomies often used in classification systems
- Ontology:
  - Taxonomy-based classification plus:
  - Graphs & relationships among entities (various levels of sophistication)
  - Enables automated reasoning & interoperation of intelligent agents
  - Standards allow programs to access info structure & content
    - RDF = Resource Description Format
    - OWL = Web Ontology Language
- Folksonomy:
  - The “wisdom of the masses”
  - How many enterprises actually classify their information

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The Benefits of Coming Together: Example #1

Legal, Records Manager, I.T collaborate to save money by employing automated classification of eRecords of Exited Employees

Case Study Measurements and Assumptions	*Results*
Average number of electronic files per exited employee	601
Average number of emails per exited employee	7418
Average time to manually classify each document	2.25 minutes
Number of documents manually classified per day	180
Annual Salary of a qualified records technician (loaded)	$55,000
Cost to manually classify per exited employee	$12,473
Cost to outsource the autoclassification of documents	$800-1200 per exited employee

Source: ARMA 2005 International Conference
"Classifying e-Records of Exited Employees: Case Study Using an Automated Classification Tool", Session Number T027

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The Benefits of Coming Together: Example #2

Hospital establishes cross-functional group that will be responsible for information management

- Information is *Restricted, Confidential, Operational, Public*
  - *How important is it to keep this information confidential?*
  - *How important is it's integrity?*
  - *How important is it's availability?*

Security and Storage determined by classification

Restricted – would seriously and adversely impact the business. The impact could include violations of legally protected privacy or of other laws
Confidential – would tend to impair functions, or would result in potential business, financial, or legal loss
Operational – would result in minimal impact or loss but involves issues of convenience, or ease of operation
Public – information that does not fall into any of the other information classifications. This information may be made generally available.

Source: http://www.psychiatry.ufl.edu/security/docs/InformationClassificationDept.pdf

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The Benefits of Coming Together: outcome

Information Type	Confidentiality	Integrity	Availability	Classification
Medical record	High	High	High	Restricted
Administrative Documents with Private Health Information (PHI)	High	Medium	Medium	Restricted
Email with PHI	High	High	High	Restricted
Patient claims or billing information with PHI	High	Medium	High	Restricted
Research information with PHI	High	High	Medium	Confidential
Budget Information	Medium	Medium	Medium	Confidential
Financial Reports	Low	High	Low	Confidential
Personnel and fiscal operations records without PII	Medium	Medium	Medium	Confidential
Research Proposals	Medium	High	Medium	Operat
Memos without PII	Low	Medium	Medium	Oper

Source: http://www.psychiatry.ufl.edu/security/docs/InformationClassificationDept.pdf

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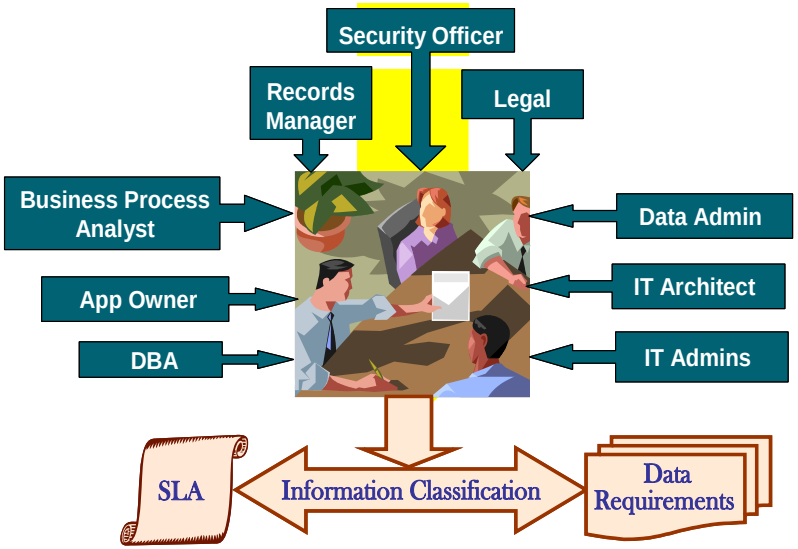
Gathering requirements from stakeholders

- Information is simply *data* to the data center
  - I.T. manages data: software, files, volumes, bits and bytes
  - Information is data with context: business decisions are based on *information*
  - *Use a collaborative process to identify information service requirements*



	Risk Management			TCO
Perspective / ***Stakeholder***	Security & Risk Mitigation	Litigation Support	Records Mgmt	Cost & Performance Mgmt
Chief Security Officer	✓			
Chief Legal Officer	✓	✓	✓	
Corporation Counsel		✓	✓	
Records Information Manager		✓	✓	
Chief Compliance Officer	✓	✓	✓	
Chief Risk Officer	✓			
Chief Financial Officer	✓			✓
Line of business	✓	✓	✓	✓
Chief Information Officer	✓	✓	✓	✓

- Collaboration enables I.T. to:
  - Identify and mitigate competing stakeholder requirements
  - Create data management policies

➲ Classification must address multiple *perspectives*

➲ Support both overlapping and non-overlapping requirements

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Service Level Management

How is Data Classified?

Automated Data Classification methods:

Classify by business process or application policies

- All data assigned same classification
- Simple; good start; a first approximation
- Net effect: ranking of applications to service tiers
- Somewhat effective for TCO Management
- *Possibly* effective for Risk Management (very coarse grained solution)

Classify by metadata-based policies

- Time last accessed, owner, file name, path, etc
- Useful for aligning data to tiers of service
  - E.g., the CEO's email receives different service than yours
- Or for placement of data to appropriate stage within a service tier
  - E.g., Hierarchical Storage Management (HSM) for a file server
- Effective for TCO Management
- *Possibly* effective for Risk Management (coarse grained solution)

Classify by content-based policies

- Content-driven alignment of data to service level requirements
- Added value for Business Intelligence, Compliance & eDiscovery
- Mostly not applicable for TCO Management
- Most effective for Risk Management

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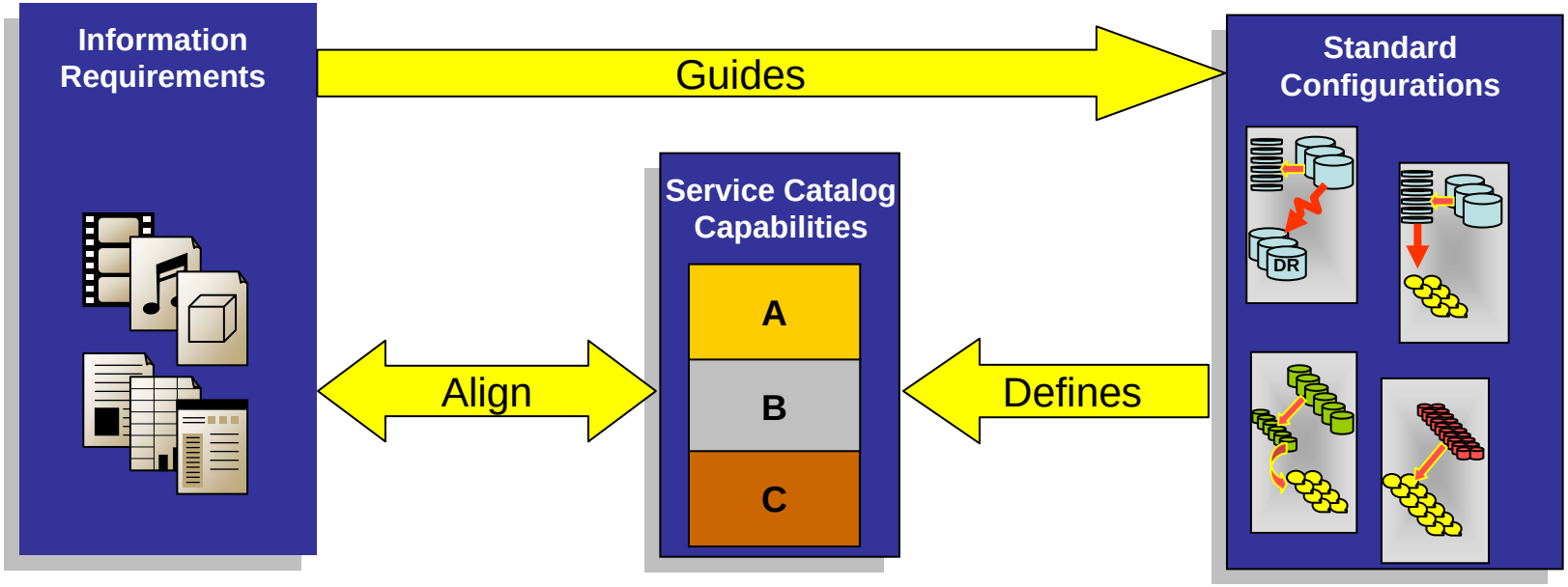
Service Level Alignment

To address TCO, Service Delivery, and/or Risk Management

- Information Classification to gather stakeholder requirements
- Create standard configurations
- Data classification to organize data based on information requirements
- Align data using Service Level Management



Service catalog capabilities may also include information policies

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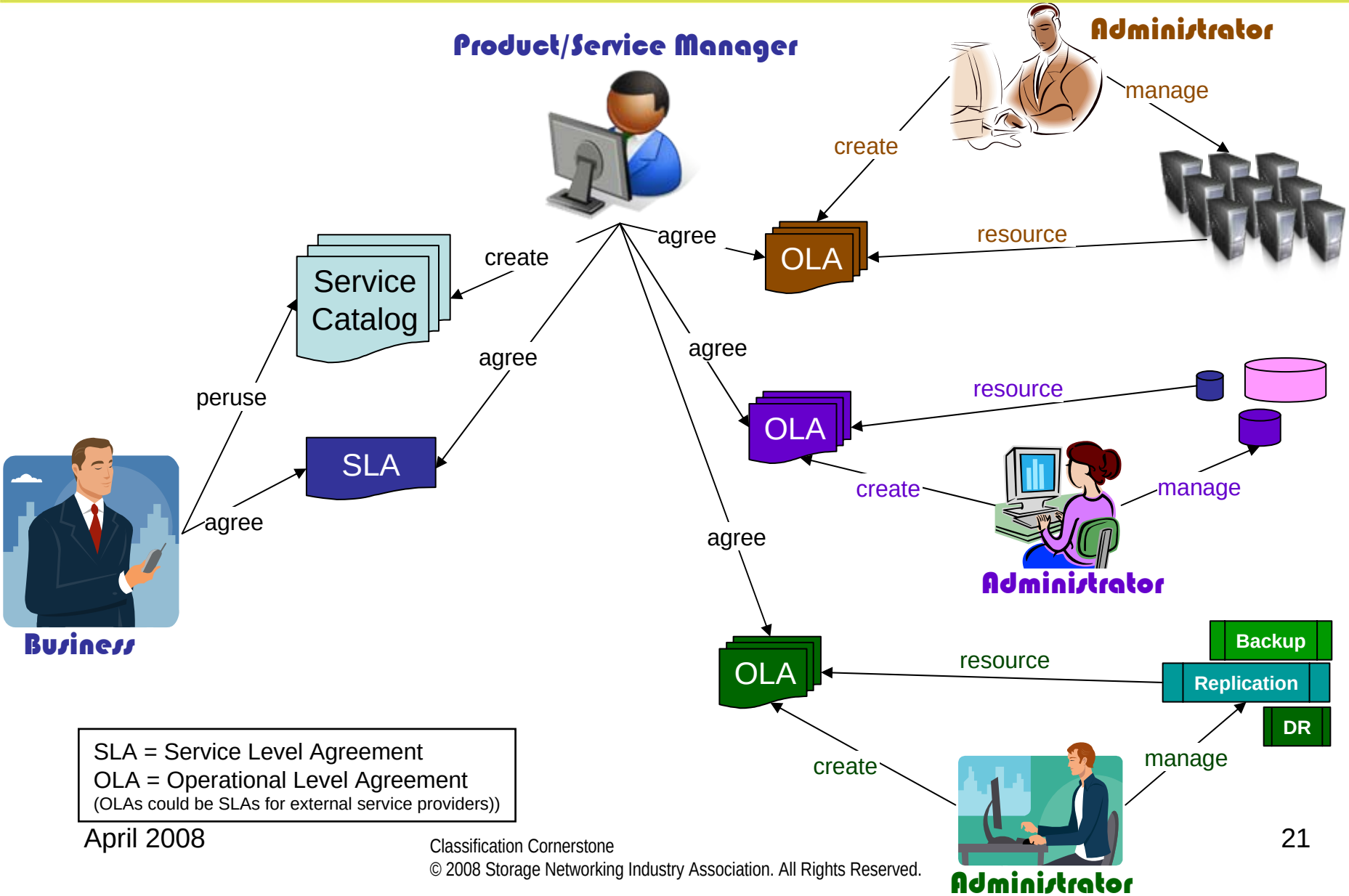
Service Level Management – who cares?



SLA = Service Level Agreement
OLA = Operational Level Agreement
(OLAs could be SLAs for external service providers))

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Service Delivery – Customer IT Sample*

	Scheme	Specification	Class 1	Class 2	Class 3	Class 4
Storage	Guaranteed Performance	Performance throughput per port (IOPS)	5,000+	Up to 5,000	Up to 3,500	Up to 1,500
		Response time (ms)	< 8ms	7-14ms	12-30ms	12-30ms
	Availability	Maximum unplanned downtime per year (mins)	< 26.5	< 26.5	< 52.5	< 263
Archive	Performance	Response time	< 1 second	< 1 second	< 24 hours	
		Throughput	<= 300 Mbps	<= 700 Mbps	<= 280 Mbps	
	Availability	Maximum downtime (yr)	<5.25 mins	<52.56 mins	< 175.2 hours	
	Retention & Disposition	Retention period	< 30 years	< 10 years	< 3 years	
		Data shredding compliance	Yes	No	No	
	Data Integrity	Guarantee of authenticity	Yes	No	No	
	Accessibility	Annual access frequency	< Hourly	< Hourly	Daily	
	Offsite	Recovery point objective	< 1 minute	< 28 hours	< 38 hours	
Operational Recovery (OR)	Recovery Classification	Recovery classification	Complete app. restore	Complete app. restore	File or file sys. restore	File or file sys. restore
	Recovery Point Objective (RPO)	Amount of data loss	1 hour	24 hours	24 hours	30 days
	Recovery Time Objective (RTO)	Time required for recovery	< 30 minutes	< 30 minutes	7 GB/minute	.5 GB/minute
	Recoverability	Ability to recover backed up data	100%	100%	98%	95%
	Retention period	Time data is retained	2 hours	24 hours	3 Weeks	15 months
Disaster Recovery (DR)	Recovery Point Objective (RPO)	Amount of data loss	0 minutes	< 4 hours	24-48 hours	24-48 hours
	Recovery Time Objective (RTO)	Time to restore data	< 2 hours	<12 hours	< 48 hours	<72 hours

*Courtesy of EMC^2 Consulting

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Adding Service Levels for Info-centric Policy Mgmt

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	Scheme	Attributes	Class 1	Class 2	Class 3	Class 4
Primary Storage	Performance	Throughput (IOPS)	Up to 5000	Up to 3,500	Up to 1,500	Up to 500
		Response time (ms)	< 8ms	7-14ms	12-30ms	12-30ms
	...	...	...	...	...	...
Indexed	Data search capability	Index method	Full Text	Metadata	None	
Archive	Performance	Response time	< 1 second	< 1 second	< 24 hours	
		Throughput	<= 300 Mbps	<= 700 Mbps	<= 280 Mbps	
	...	...	...	...	...	
	Retention	Retention period	< 30 years	< 10 years	< 3 years	
	Data Integrity & Authenticity	Guarantee of immutability	Yes	No	No	
User ID	Authentication	ID challenge method	Physical	Logical	Logical	None
	User Login	Scope of login	Unique	Unique	Federated	Federated
Audit	3rd party log gather	Audit action level	Intervene	Alert	Monitor	None
	Audit Log Storage	Guarantee of immutability	Yes	Yes	No	No
Data Security	Encryption	Data at rest	Tamper-Proof	Centralized	None	
		Secure data movement	Enterprise	Application	None	
		Data shredding at deletion	Destroy	DoD Shred	Simple Delete	
	Information Rights Mgmt	Customer Data Access	PII-Private	PCI-CC	Confidential	Basic
Operational Recovery (OR)	Recovery Point Objective (RPO)	Amount of data loss	1 hour	24 hours	24 hours	30 days
	Recovery Time Objective (RTO)	Time to restore data	< 30 minutes	< 30 minutes	7 GB/minute	.5 GB/minute
	Retention	Retention period	2 hours	24 hours	3 Weeks	15 months
Disaster Recovery (DR)	Recovery Point Objective (RPO)	Amount of data loss	0 minutes	< 4 hours	24-48 hours	24-48 hours
	Recovery Time Objective (RTO)	Time to restore data	< 2 hours	<12 hours	< 48 hours	<72 hours

Corresponding Solution Profiles

	Scheme	Attributes	Class 1	Class 2	Class 3	Class 4
Primary Storage			Hi-end FC RAID-1	Hi-end FC RAID-5	Mid-tier FC RAID-5	Mid-tier ATA RAID-5
Indexed			Text Indexing policy			
Archive			CAS	ATA	Tape	
User ID			HW Token, Local Login	SW Token, Local Login	SW Token, LDAP Login	LDAP Login
Audit			SIEM Intervention, on CAS	SIEM Alerts, on CAS	SIEM Monitoring, on disk	No SIEM Monitoring
Data Security			Secure/HW key vs. central key manager			
			IPSEC, SSL, None			
			HW destroy, DoD “shred”, standard delete			
			IRM Key Manager policies			
Operational Recovery (OR)			Many Snaps	Fewer Snaps	B2D / VTL	B2T
Disaster Recovery (DR)			Sync Mirror	Async Mirror	Remote DiskCopy	B2T

Service Level Management Summary

- Broad context
  - Business / IT interaction (SLAs)
  - IT / IT interaction (OLAs)
  - Service Packaging (Service Catalogs)
  - Plus impact to all data center process areas…
- Resource Management
- Information-centric Policy Management

Service Level Management offers a critical, abstract, expression language for resource and policy management

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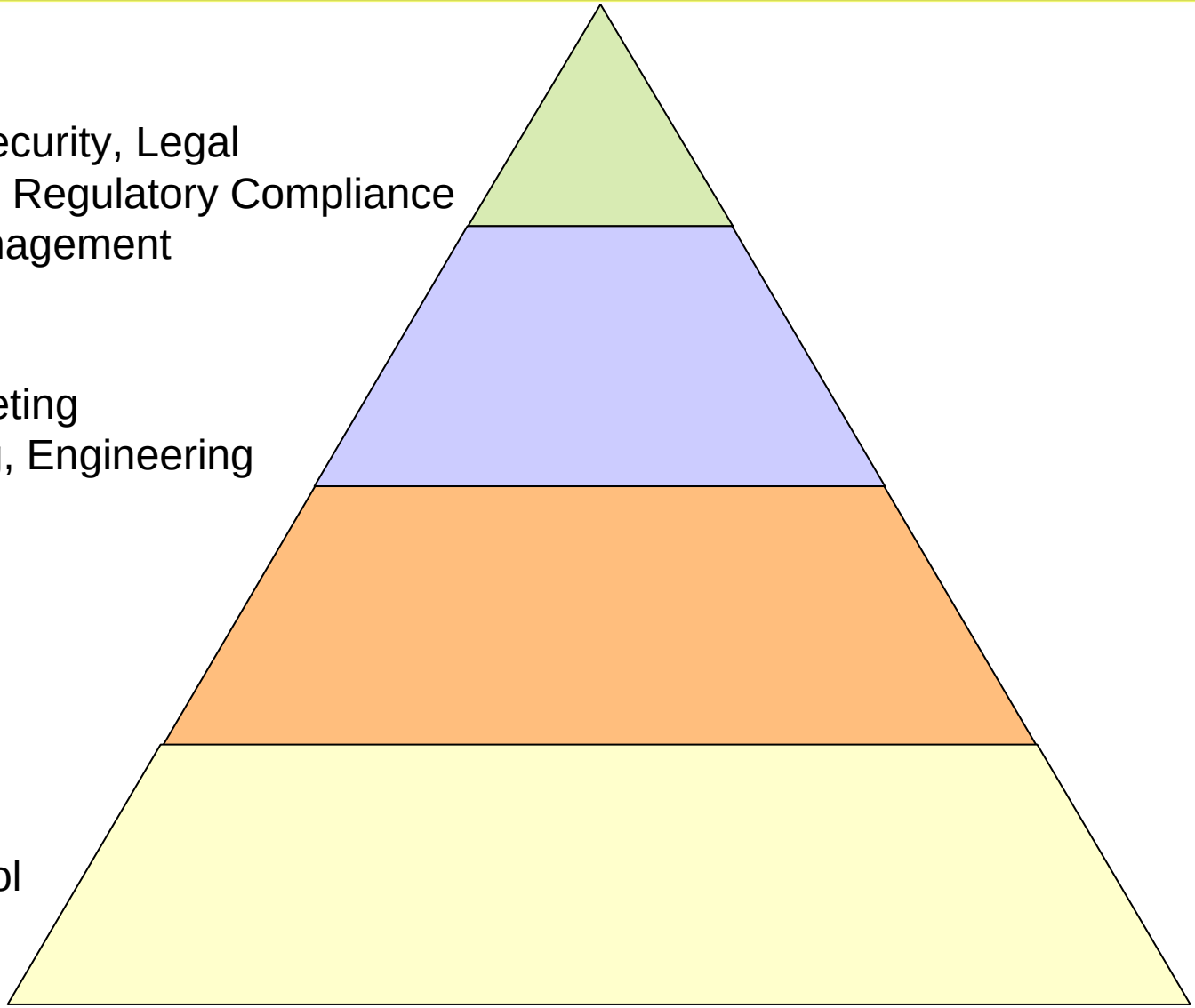
Automating Policy Management

Many Policy Domains

- Corporate
  - Information Security, Legal
  - Governmental Regulatory Compliance
  - Email, IM Management
- Business Unit
  - Finance
  - Sales & Marketing
  - Manufacturing, Engineering
- User
  - Security
  - Distribution
  - Retention
- Resources
  - Utilization
  - Consolidation
  - Change control
  - CMDB



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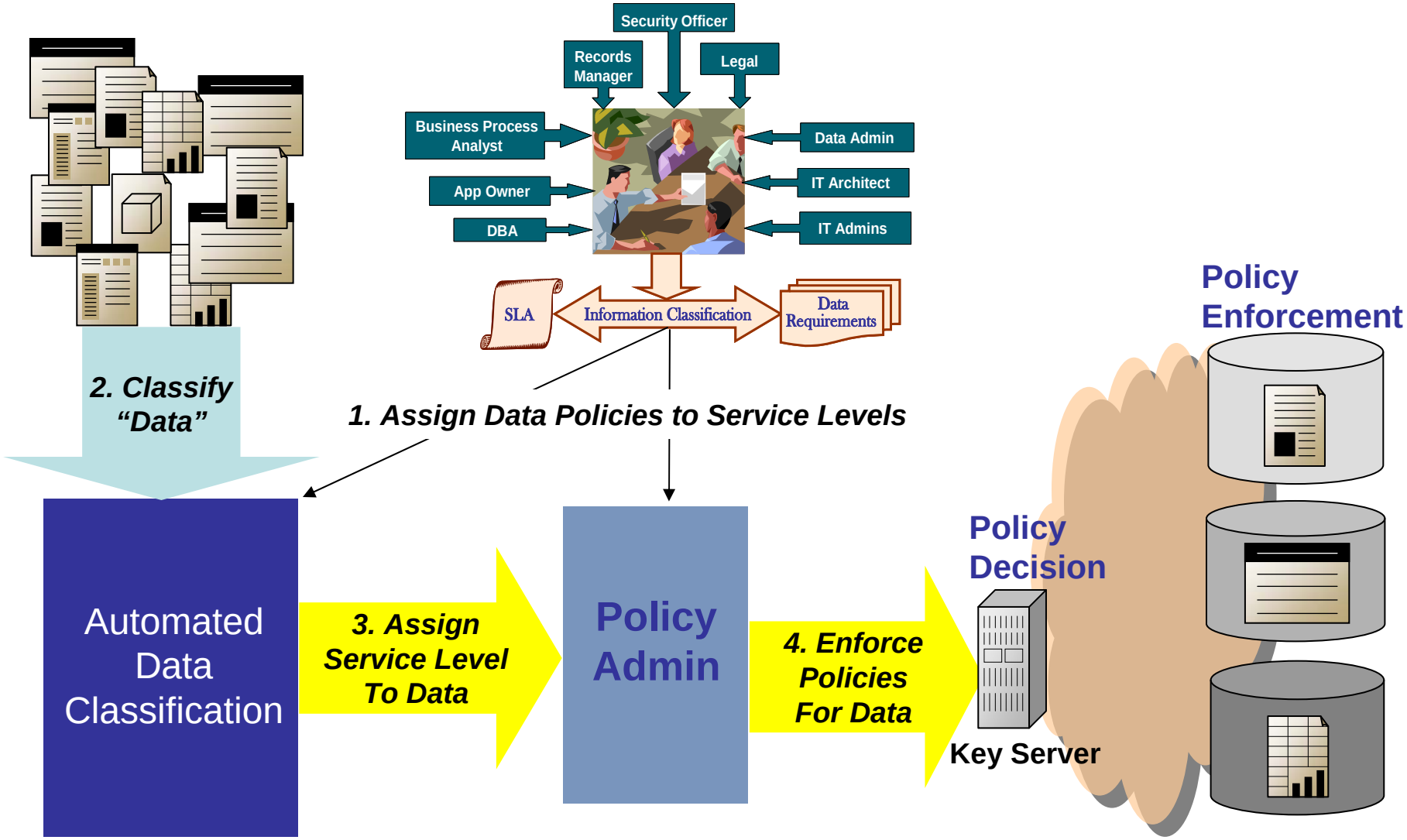
Assigning Policies via Automated Data Classification



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Information-centric Policy Management

- Assign policies to data based on classification
  - Application, metadata, and/or content
- Policies derived from Information Requirements
  - Data placement
  - Security
  - Information Rights Management
  - Data Leakage Protection
  - Data retention
  - Search & Index
  - Authentication & Authorization
  - And others…
- Automated data classification provides scalability

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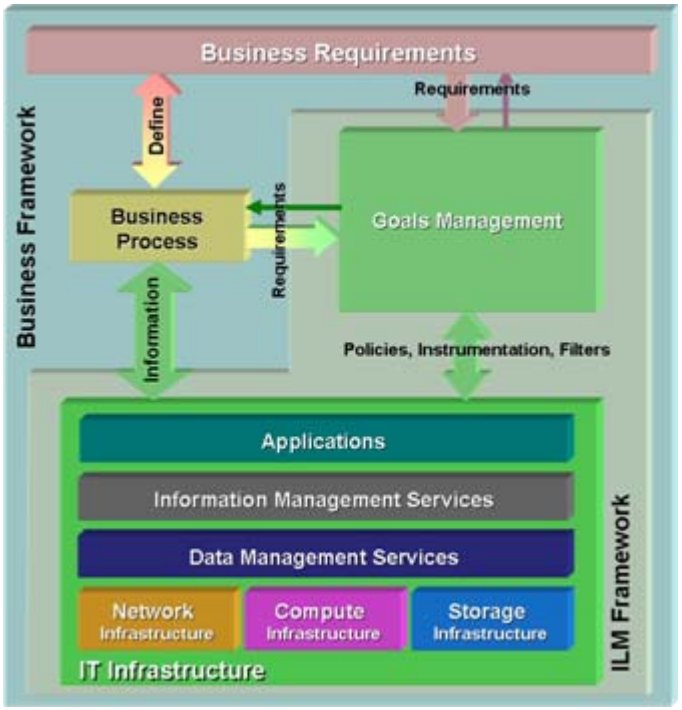
DMF's ILM Framework for the Datacenter

For more information on SNIA's Data Management Forum (DMF) visit the DMF website at

http://www.snia-dmf.org



Check out SNIA Tutorial:

The Secret Sauce of ILM: The Professional ILM Assessment

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Q&A/Feedback

Please send any comments on this tutorial to SNIA: trackdatamgmt@snia.org

Many thanks to the following individuals for their contributions to this tutorial:

Edgar StPierre
Sheila Childs
Bob Rogers
John Field

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Abbreviations used in this tutorial

- **Async**: Asynchronous
- **ATA**: Advanced Technology Attachment
- **B2D**: Backup To Disk
- **B2T**: Backup To Tape
- **CAS**: Content-Addressable Storage
- **DoD**: Department of Defense
- **FC**: Fibre Channel
- **IOPS**: Input/Ouput Operations Per Second
- **IPSEC**: Internet Protocol Security
- **IRM**: Information Rights Management
- **LDAP**: Lightweight Directory Access Protocol
- **HSM:** Hierarchical Storage Management
- **HW**: Hardware
- **ms**: milliseconds
- **PCI**: Payment Card Industry
- **PII**: Personally Identifiable Information
- **SIEM**: Security Incident and Event Management
- **SSL**: Secure Sockets Layer
- **SW**: Software
- **Sync**: Synchronous
- **TCO**: Total Cost of Ownership
- **VTL**: Virtual Tape Library

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