WHITE PAPER
February 2006

Information Lifecycle Management Maturity Benchmark Study

Overview

ABSTRACT

Information lifecycle management (ILM) is a sustainable storage strategy that balances the cost of storing and managing information with its business value.

This report is the result of a benchmark study assessing the maturity of over 900 IT organizations in North America and Western Europe. We present the overall results and some key lessons learned from the study.

This paper is the first of a two-part series describing the results of the benchmark study; it addresses the results at a high level. The follow-on paper is aimed at understanding the progression of activities that organizations undertake as they become more mature.

Sun microsystems

1 Executive Summary

Information lifecycle management (ILM) is a sustainable storage strategy that balances the cost of storing and managing information with its business value. ILM provides a practical methodology for aligning storage costs with business priorities.

In a recent white paper, we presented a model describing five states of maturity for information lifecycle management. Our purpose was to present a vision and practical advice for organizations that are deploying an ILM strategy. Although we believe that our vision for ILM is not fully attainable today, we also believe that solid business benefit from ILM is attainable today[1]. In this paper, we will briefly overview the ILM maturity model that was used as the basis of the benchmarking study; however, the reader may gain additional insight from reading the earlier paper in addition to this report.

Five stages of maturity comprise one axis of the two-dimensional maturity model. The five stages range from a base state (chaotic) through stages denoted as reactive, proactive, optimized, and finally, self-aware. Generally, the maturity stages are characterized by increasing levels of automation and integration, and the depth of alignment between business processes and ILM. On the other axis of the model, we have defined a set of storage management elements that provide linkage between business intent and storage management reality.

In August through October 2005, we conducted a research study to benchmark the ILM maturity of a large sample (900+ respondents) based on our maturity model. The research tested 40 criteria to diagnose each organization's stage of ILM development. In general, they averaged close to the midpoint of the model. Forty-eight percent had achieved a proactive state of maturity, with 34 percent below proactive and 18 percent above.

Organizations that were rated as advanced by their participants tend to have a solid handle on IT efficiency and IT/business alignment. They have good management and measurement systems. They have a strong advantage in terms of policy-based storage management. Conversely, organizations rated as less mature seem to be struggling with storage management. They are not efficient, nor effective, and their IT/business alignment is weak.

There are significant differences among the maturity levels described by participants from different industries, from different size data centers, and based on the participant's role in IT.

- In general, participants from smaller data centers rate themselves lower than their large data center counterparts.
- Health care and financial services occupy the upper echelon of maturity with average scores significantly higher than the overall average. Manufacturing, services, and information technology are not significantly different from the overall mean. Communications, transportation, utilities, distribution, and public sector are significantly below the overall mean. Clear differences exist, perhaps based on business models and the importance of IT to the business.
- Technical staff participants tend to be more critical of their organizations compared to executives, scoring their organizations below proactive almost twice as often as senior managers.

In Part II of this white paper series, we will examine the changes that organizations go through while maturing. ILM maturity has business benefits and costs that all IT organizations should imbed into their thinking as they formulate their strategies. Our goal is to help inform IT professionals to facilitate their success.

[1] *See "Information Lifecycle Management — Maturity Model " at www.sun.com*

2 Benchmark Study

2.1 Introduction

In August through October 2005, a research project was conducted by the Sun Microsystems Market and Customer Research team to develop a benchmark of performance for the Sun Microsystems Information Lifecycle Management Maturity Model. A total of 905 IT executives, middle managers, and technical staff participated, representing a broad distribution of industries.

The ILM Maturity Model survey is an outgrowth of Sun Microsystems' work in developing a maturity model to describe levels of growth associated with an ILM implementation. Forty storage management behaviors are tested to complete the survey[2].

2.2 Research process and rigor

The research and analysis processes used in this survey represent the highest level of professional rigor and represent valuable intellectual property of Sun Microsystems. Our analysts are highly experienced in both research techniques and storage issues. Our data collection firm is highly respected.

We believe that the results of this broad study represent the most significant effort to date by any vendor in the area of information lifecycle management.

3 Benchmark Results

3.1 Overall maturity

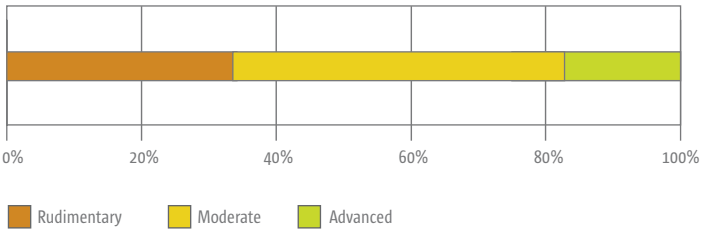
On average, the participants scored their organizations below the center point (45.9 on a 1–100 scale) of the maturity scale, with very few respondents at the extremes.

The five maturity classes tested in the model are:

- **Chaotic** – Ad hoc approaches are used to manage storage.
- **Reactive** – Multiple disconnected processes/procedures are in place for storage management.
- **Proactive** – Standardized and documented procedures are in place for storage management.
- **Optimized** – Policy-based storage management processes are standardized; compliance is managed.
- **Self-aware** – Storage management processes have been elevated to best practices levels.

Overall information management maturity falls in between reactive and proactive.

Figure 1. Overall Assessment Rating.



[2] *See the appendices for a description of the maturity model, a list of the 40 criteria in the model, and the demographics of the participants.*

Due to the small percentage of chaotic and self-aware ratings, we will describe the maturity levels as they are depicted in the graphic shown in Figure 1, with chaotic and reactive combined into "rudimentary," and optimized and self-aware combined into "advanced." "Moderate" denotes the organizations with a proactive level of maturity. Thirty-four percent of the participants rated their ILM maturity as rudimentary, 48 percent as moderate and 18 percent as advanced.

4 Key Findings

4.1 The overall maturity survey appears to be a good test of ILM maturity.

Overall, participants scored a mean of 45.9 on a 1–100 scale. The distribution of results was "bell-shaped" with a slightly higher frequency at the center than a normal distribution. All forty criteria correlate positively (and significantly) to the overall score, and to the summary questions on IT efficiency and business/IT alignment.

There are five sections in the ILM maturity model — the scores for business/IT alignment and business value integration were significantly higher than the overall mean. Placement and storage management integration were close to the overall mean and infrastructure scored significantly lower than the overall mean.

4.2 ILM maturity varies significantly by data center size and industry.

Generally, smaller data centers were less mature than large data centers. Participants from data centers with fewer than 100 terabytes of disk rated themselves at 44.32 on the 1–100 scale and were half as likely to be in an "advanced" state of maturity as those with more than 200 terabytes of disk in their data centers. Large data centers (200 terabytes+) scored 47.2.

Industry differences were more pronounced, with public sector participants rating their organizations at 42.0 on the 1–100 scale and healthcare participants rating themselves at 50.3. Financial services organizations also rated high (48.7).

4.3 Geography is not much of a determinant of ILM maturity.

The maturity differences between geographies seems more a function of demographics rather than absolute differences.

Geographic differences initially looked strong with Western European participants scoring themselves at 40.2 on the 1–100 scale, almost 20 percent lower than North American participants (49.7). As it turns out, most of this difference can be explained by sample differences. The Western European sample contained a large number of participants from industries that tended to score lower, from smaller firms, less-complex operating environments, and from technical participants that tended to score lower. Adjusting for these sample differences removes most of the apparent difference between the North American and European results. Thus we conclude that there are minimal differences in ILM maturity introduced by the location of a company.

We have all heard many times that "(some location or country) is different." Based on this analysis we both agree and disagree. The demographics of a country may differ significantly from another, and when generalizing about that geography there are indeed differences. But in context of ILM, an executive participant from a large financial services firm with a complex multi-tier operating environment in Germany responds remarkably like an executive from a U.S. firm with similar demographics. We attribute this to the globalization of IT in large firms, and the globalization of communications and knowledge. Frankly, we see no reason why developed countries merely separated by a large body of water should have a different "state of the art" when they have access to the same technology and knowledge.

Job role seems to color perceptions on information management maturity. Senior positions view maturity more optimistically.

4.4 Organizational ILM maturity is in the eye of the beholder.

A strong difference in maturity ratings was demonstrated based on job role or level. Senior managers rated their organizations at an average of 49.7 and technical staff at 40.8. Technical staff managers were almost twice as likely to rate their organizations at a "rudimentary" level as senior managers; conversely senior managers were more than twice as likely to rate their organizations "advanced" as technical staff. This tendency continued within the job levels with the system administrators rating their organizations lower than any other job title within technical staff.

Generally, this is not unusual in IT strategy and management assessments, and is likely attributable to differences in expectations, breadth of knowledge, and awareness of operational details.

4.5 There are key elements of maturity that have the greatest impact on IT efficiency and the alignment of IT with the business.

Based on analysis of the correlations between the summary questions and specific criteria in the model, there are a few clear leaders in impact.

Alignment is most closely correlated to service level management, the deployment of standard service levels, data classification, data security, and metadata management. IT efficiency is closely correlated with the use of storage resource management tools, use of an infrastructure model linking storage infrastructure to business applications and processes, and the implementation of a granular storage infrastructure with multiple storage tiers and automated data movement.

4.6 There are clear groups of performance and strategies for achieving ILM maturity.

Some strong commonalities emerge when comparing different levels of maturity. For example, participants tended to describe organizations as having an infrastructure focus, a business focus, or a balanced approach across the entire ILM maturity model. This is the primary subject of Part II of the white paper series on the ILM maturity benchmark results.[3]

5 Detailed Findings

5.1 Subpopulations

In addition to collecting information about ILM maturity, the research project collected demographic information from the participants.

- The most prevalent industry was information technology (17 percent of participants), closely followed by financial services (16 percent), manufacturing (13 percent), and health care (11 percent).
- Forty-three percent of the participants were senior managers — predominately CIOs, CTOs, and VP levels within IT. Thirty-seven percent of the participants were middle managers in IT and 20 percent were IT technical staff.
- Of the participants, 36.6 percent had fewer than 100 terabytes of data center disk installed, and only 4 percent had fewer than 25 terabytes; 22.8 percent of the participants had 100 to 199 terabytes installed, and 40.6 percent had over 200 terabytes (22 percent exceeded 500 terabytes).
- About 40 percent of the participants were from Western Europe (evenly split between the U.K., France, and Germany) and 60 percent of the participants were from North America, with almost all of the North American participants from the USA (95 percent).

Significant differences in maturity were reported by industry, the participant's job level or role, the quantity of data center disk, operating environment, and geography.

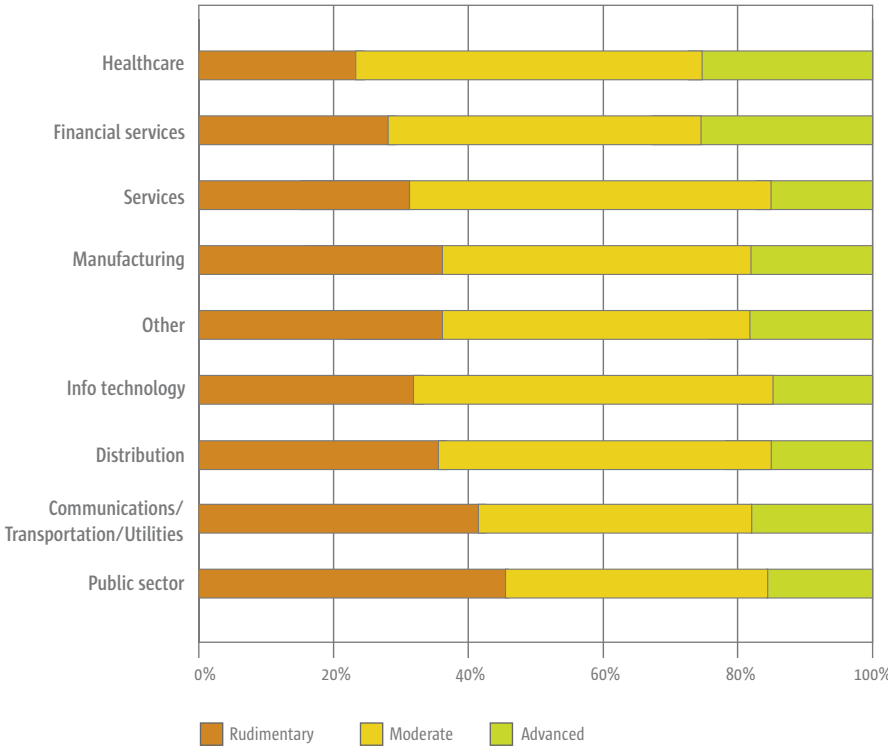
[3] See ILM Benchmark White Paper — Part II — "Maturity Progression" at www.sun.com

The strategic value of IT is a good indicator of information management maturity. Health care and financial services are the more mature industries.

5.2 Industry

- Health care and financial services occupy the upper echelon of maturity with average scores significantly higher than the overall average.
- Manufacturing, services, and information technology are not significantly different from the overall mean.
- Communications, transportation, utilities, distribution, and public sector are significantly below the overall mean. Clear differences exist, perhaps based on business models and the importance of IT to the business.

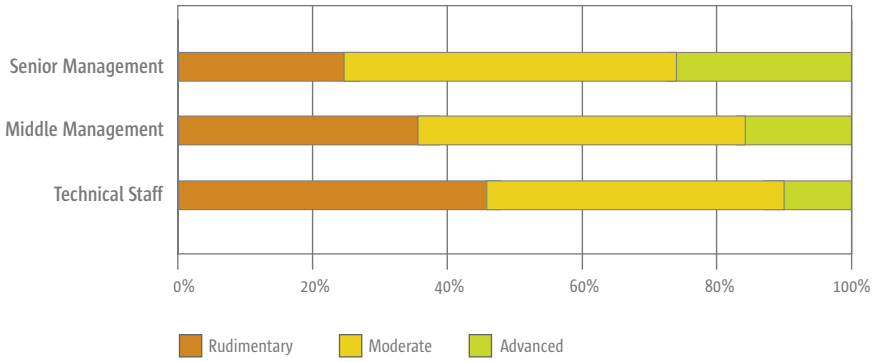
Figure 2. Overall Rating - by Industry.



5.3 Job role

- There is a clear difference among the scores submitted by senior managers, middle managers, and technical staff, with almost a ten point difference (on a scale of 1–100) separating staff from senior management.
- Technical staff is more than twice as likely to score their organization as rudimentary and less than half as likely to score their organization as advanced than senior management. An ILM "perception gap" clearly exists.

Figure 3. Overall Rating - by Job Role.

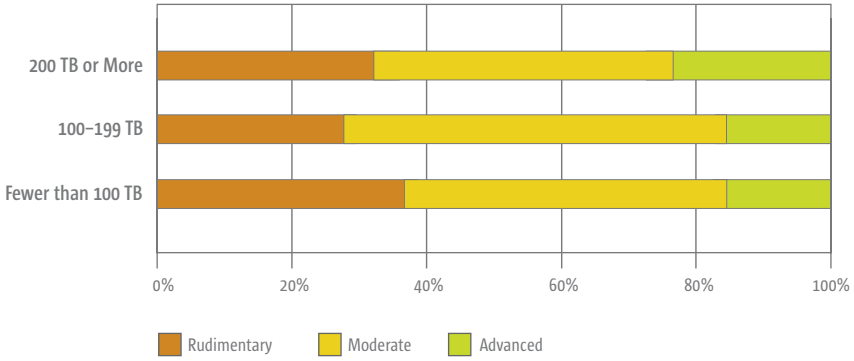


5.4 Data center disk

Larger data centers, based on disk storage capacity, rate themselves as more mature than smaller data centers.

- While the differences in the results based on data center disk installation size are smaller then those based on job roles, clear differences exist.
- Participants from large data centers (>200 terabytes) are about 1.3 times more likely to rate themselves as advanced when compared to their counterparts from small data centers (fewer than 100 terabytes).
- In the smallest data centers (fewer than 100 terabytes) the composition of the rudimentary group contains significantly more participants in a chaotic state when compared to the other groups. In the largest centers (200 terabytes or more), the advanced group contains more self-aware participants, when compared to the other groups.

Figure 4. Overall Rating - by Disk Capacity.

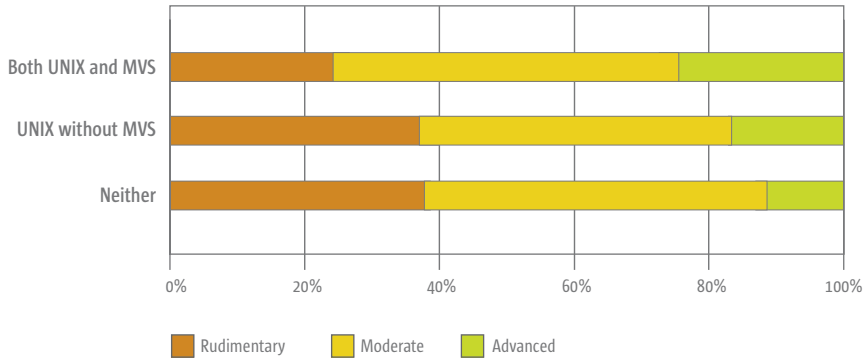


5.5 Operating environment

IT operations with MVS as part of that operation tend to be more mature than UNIX-only environments.

- Differences in maturity among different operating environments are also strong. The most complex environments with both MVS (MVS, zOS or OS/390) and UNIX® operating systems generally have a higher level of maturity compared to environments without MVS operating systems.
- Environments with UNIX systems (while they appear similar in the simplified chart in Figure 5) are also slightly more mature in general than those with Win32 operating systems as the main processing environment ("neither" in the chart in Figure 5). Closer examination of the rudimentary and advanced populations results in the finding that a Win32 environment is more likely to be in a chaotic state and half as likely to be in a self-aware state when compared to UNIX-based environments.
- While the other demographic factors do have some impact (for example the entire distribution based on operating environment "shifts upward" for organizations with large data centers), operating environment does appear to have a statistically valid impact on ILM maturity.
- The strongest factors driving the higher maturity of MVS/UNIX versus UNIX-led environments are metrics, metadata management, service level management, and resource management. This suggests that the higher maturity of MVS/UNIX environments may have more to do with process, tools, and management style than infrastructure technology.

Figure 5. Overall Rating - by Operating Environment.

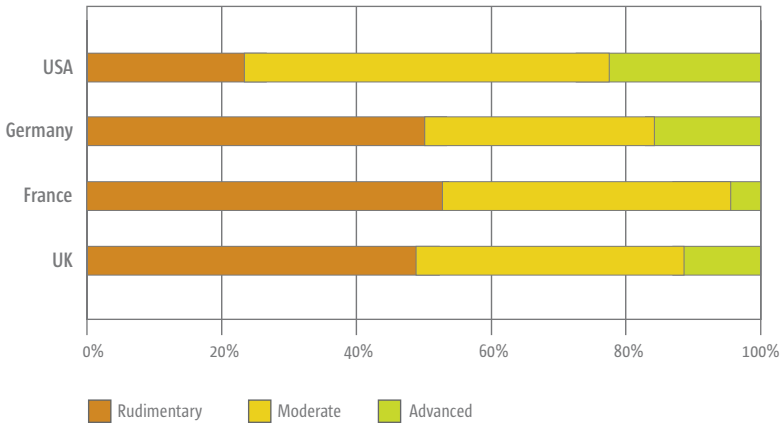


5.6 Geography

Geography appears to be a strong differentiator. However, these differences are more a matter of demographics, or mix of represented industries and job roles.

- There appear to be strong differences in the results from Western Europe compared to North America. The chart in Figure 6 depicts the differences on a country level for all countries with a statistically valid sample size.
- In general, Western European countries performed in a similar manner with France, slightly less mature than the U.K. and Germany.
- A significant portion of the difference between the North American and Western European results can be attributed to sample differences. For example the Western European sample contains a significantly higher proportion of technical staff, and a lower proportion of executives when compared to the North American sample. This tends to lower the overall ratings by the Western European participants. In a similar vein, the European sample tends to have a high proportion of industries that, in general, do not perform well, and a lower proportion of those that do.

Figure 6. Overall Rating - by Country.



- After removing the sample differences between Western Europe and North America the gap is closed considerably. The charts below depict the base data comparing North America with Western Europe and the results with sample adjustments (weighting).

  Adjusting for the sample differences does "close the gap" significantly between the results from Western Europe and North America. The small difference remaining is not statistically significant. Thus we conclude that there are minimal differences in ILM maturity introduced by the location of a company, and that industry differences and data center size differences are considerably more significant.

Figure 7. Overall Rating - by Country (Base).

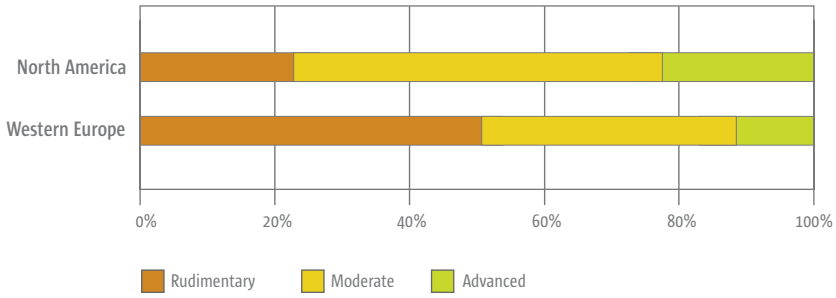
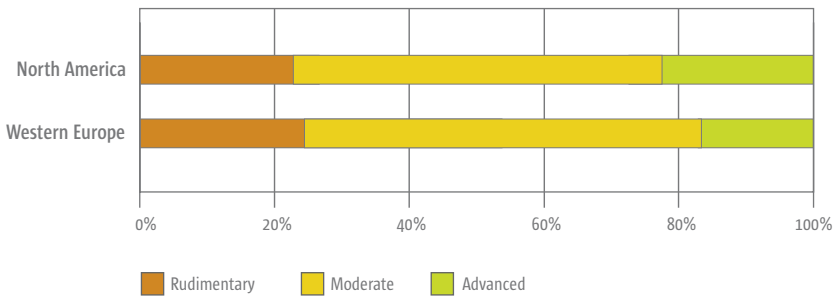


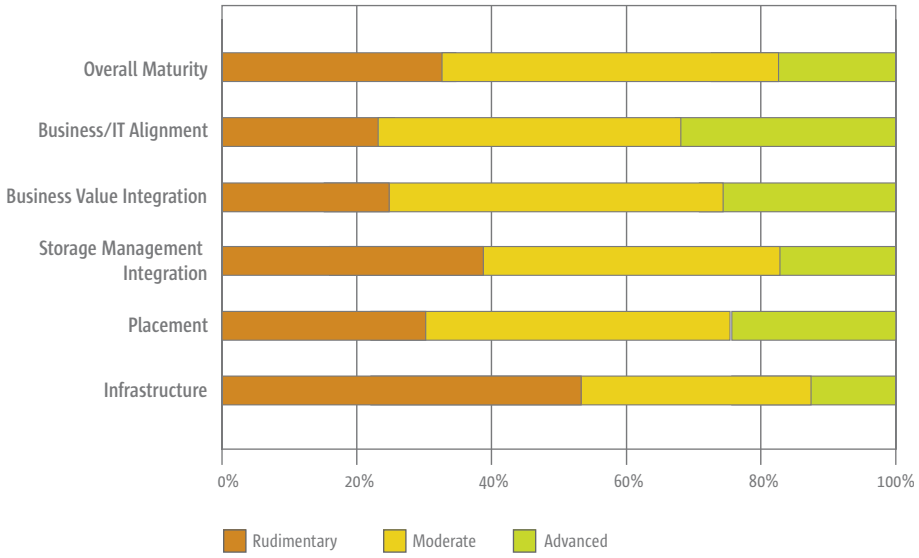
Figure 8. Overall Rating - by Country (Weighted).



5.7 ILM capability layers

The ILM maturity model links business intent (plans, requirements, and service levels) downward through a layer of integrating processes (policy management and data classification) into storage management integration. Storage management is further linked to physical data movement and placement, and finally, infrastructure. Together these elements define a model for ILM, integrating business intent with storage reality. The elements are structured into five layers.

Figure 9. Ratings - by Section



Participants rated their maturity as highest in the business/IT alignment layer (average score of 52.0 on a scale of 1–100), followed by business value integration (50.1), placement (47.65) and storage management integration (44.87). Infrastructure was rated lowest overall with an average score of 39.64 on a 1–100 scale.

5.8 Business/IT alignment

Overall maturity is the product of maturity in several disciplines. Business/IT alignment is the strongest skill, indicating that business requirements are frequently communicated and understood.

Business/IT alignment addresses the business interface defining the relationship of IT and business processes. The criteria in this section of the model all relate to the integration of service level management information into ILM storage management processes.

Overall, the ratings for business/IT alignment and for ILM maturity were significantly different, with business/IT alignment achieving the highest score in any area of capability in the model. This is great news for ILM; integration with the business, driving business intent into storage management practices, is key to achieving advanced ILM maturity.

- Both European and North American participants demonstrate a large positive difference between business/IT alignment and their overall scores.
- Participants in the services industry show a somewhat dramatic difference between their assessment of their business alignment and overall performance, rating business/IT alignment significantly lower. While there are other differences from industry to industry, that is certainly the most pronounced.
- Public sector, manufacturing, and distribution companies tend to view their alignment maturity favorably, and financial services is mildly negative about alignment compared to their overall performance.

5.9 Business value integration

The business value integration layer provides the linkage between business processes and storage management, tying business processes to policy, data classification, and security. This set of activities links the information collected in business/IT alignment to storage management action. It includes policy formulation, data classification, and information security policy.

Overall, participants rated themselves higher on this topic compared to overall maturity. This also is great news for ILM; business integration is a key requirement of strategic ILM maturity.

Significant observations among subpopulations include:

- Both North American and European participants demonstrate a large positive difference between business value integration and their overall scores, with very little difference between geographic groups in the ratio of this section to the overall scores.
- Some variance by industry is apparent, with public sector, manufacturing, and distribution showing higher scores for integration, and all other industries lagging on integration compared to their overall maturity (communication, transportation, and utilities lag dramatically).

5.10 Storage management integration

The storage management integration layer links policy and classification defined in the business value integration layer to the physical actions of managing storage. It includes resource management, metadata management, and storage measurement.

Significant observations among subpopulations include:

- Technical staff participants tended to be positive regarding their storage management maturity relative to overall maturity, but in general, rated both lower than management participants.
- Financial services and communications organizations were the only subpopulations that rated their storage management maturity high compared to their overall maturity.

5.11 Placement

The information placement layer involves activities that optimize data location, including data protection, retention management, and storage optimization processes and tools. This is the physical layer of the maturity model linking storage management policy and tools to infrastructure.

Significant observations among subpopulations include:

- Both North American and European participants show only minor differences between their storage placement scores and overall results.
- Technical staff rated their placement maturity significantly higher than overall maturity, while senior management did not.
- Across the industry groups, the ratio of placement maturity to overall maturity is fairly consistent.

Overall maturity is the product of maturity in several disciplines. Infrastructure is the weakest skill, indicating relative inflexibility of storage infrastructure with respect to the overall operations.

5.11 Infrastructure

The physical Infrastructure consists of the physical hardware and software used to store data, interconnect storage and servers, move information, and monitor and manage storage. The model in this layer involves testing infrastructure granularity, resiliency, and adaptability.

Significant observations among subpopulations include:

- Both North American and European participants rated themselves low on infrastructure compared to overall maturity.
- Distribution and public sector industry participants rated their infrastructure maturity significantly low relative to their overall maturity. Services and financial services companies showed high scores for infrastructure compared to their overall rating.

6 Appendix

6.1 The ILM maturity model

(This section is provided as a summary refresher of the ILM Maturity Model.)

6.1.1 Stages of maturity

The ILM maturity model is intended to provide direction to IT organizations seeking to evolve their ILM implementation.

We have defined five states of maturity in the model:

- Chaotic — Ad hoc approaches are used to manage storage.
- Reactive — Multiple processes/procedures are in place for storage management, relying on individuals' knowledge and experience. Data protection (backup/DR) is consolidated.
- Proactive — Standardized and documented procedures, generally unsophisticated, are used. Service level management has resulted in a definition of standard service levels, which have been translated into ILM data classes and policies.
- Optimized — Policy-based storage management processes are standardized, and compliance is managed. Enterprise content management is linked to storage optimization efforts.
- Self-aware — Storage management processes have been elevated to best practices levels; continuous improvement and benchmarking are in place. The IT organization supports rapid adaptation to business changes.

Table A-1. Summary of ILM Maturity Stages.

Five Stages of Information Lifecycle Management Maturity

Chaotic	Reactive	Proactive	Optimized	Self-aware
No ILm initiative	Ad hoc management	Standardized	Virtualized	Predictive
Archive and backup fragmented and incomplete	Driven by exception	Process-driven	Policy-driven	Content-driven
One data class	Manual storage management	Standard service levels	Business-driven service levels	On-demand service
Static infrastructure	Backup consolidation	Planning	Integrated planning	Business process alignment
	Archive islands	Consolidation	Application alignment	On-demand infrastructure
		ECM		

Fundamentally, information lifecycle management depends on linking business value to storage management actions. We define "optimized" as "business-value optimized." To attain business-value-based optimization requires linkage between business process

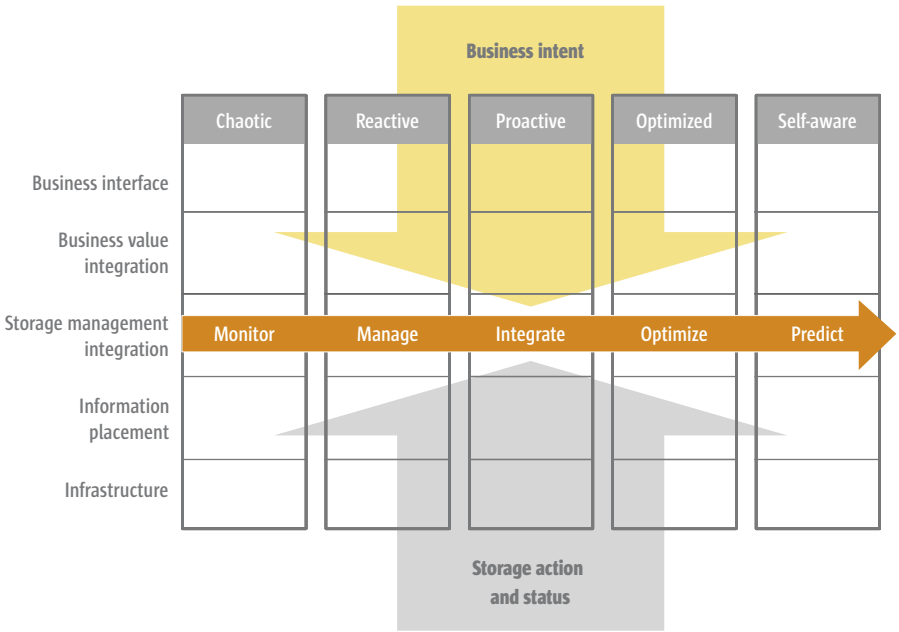
requirements (service levels) and use of infrastructure. ILM must address issues beyond access frequency to decide where in the infrastructure to place a given data object. ILM must deal with data recovery and protection, discovery, retention and disposal, and security. To be truly linked to business value, ILM must be content aware.

6.1.2 Elements of maturity

The ILM maturity model is structured to link business intent (plans, requirements, and service levels) downward through a layer of integrating processes (policy management and data classification) and into the model "gearbox" of storage management integration. From the bottom up, infrastructure is linked to information placement (data protection, archive, and optimization) and into the management integration layer. Together these elements define a top-down and bottom-up model for ILM, integrating business intent with storage reality. The elements are structured into five layers:

- The **business interface** defining the relationship of IT and business processes
- A **business value integration** layer providing the linkage between business processes and storage management, tying business processes to policy, data classification, and security
- A **storage management integration** layer linking intended actions and the actual outcomes of storage management actions
- An **information placement** layer involving activities that optimize data location, including data protection, retention management, and optimization processes and tools
- The **physical infrastructure** consisting of the physical hardware and software used to store data, interconnect storage and servers, move information, and monitor and manage storage

Figure A-1. ILM Maturity Model



6.2 Elements of the model

- Business/IT alignment
  - Regular communications with end users
  - Formal service level planning
  - Storage management based on service level agreements
  - Standard service levels
  - Standard service cost structures
  - Infrastructure model based on applications
  - Contents of service level agreements
- Business value integration
  - Centralized storage management
  - Automated policy management
  - Central policy statement repository
  - Classification based on business value
  - Classification integrated with business information taxonomy
  - Classification supports tiered storage
  - Classification criteria
  - Security integrated with storage management
  - Storage and network security linked
- Storage management integration
  - Utilization measured — resource management
  - Automated resource management
  - Infrastructure model linked to applications
  - Accurate infrastructure model
  - Comprehensive metadata
  - Rich metadata collected
  - Component metrics collected/reported
  - Applications/process metrics collected/reported
  - Single view of metrics available
  - Balanced scorecard used
  - Quality of service — continuous improvement program
- Placement
  - Consolidated archive
  - Automated retention management
  - Content-based discovery capability
  - Retention based on business value
  - Consolidated data protection
  - Confidence in data protection
  - Automated recovery
  - Multiple level data protection

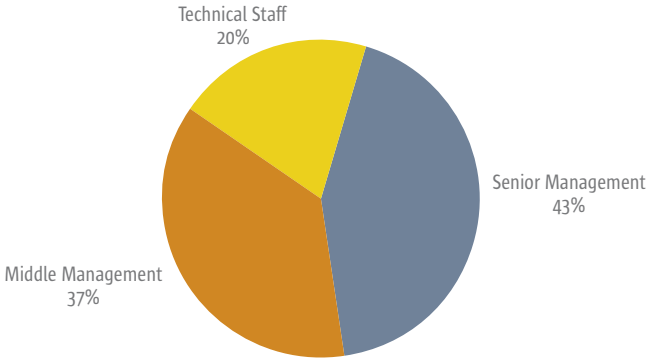
- Storage optimized
- Automated data movement
- Lowest possible cost storage tiers implemented

- Infrastructure
  - Granular infrastructure
  - Resilient infrastructure
  - Adaptive infrastructure

6.3 Research study demographics

The 900+ participants in the sample were distributed across geographies, industries, job roles, and data center installed disk terabytes as follows:

Figure A-2. Job Role



6.3.1 Job role

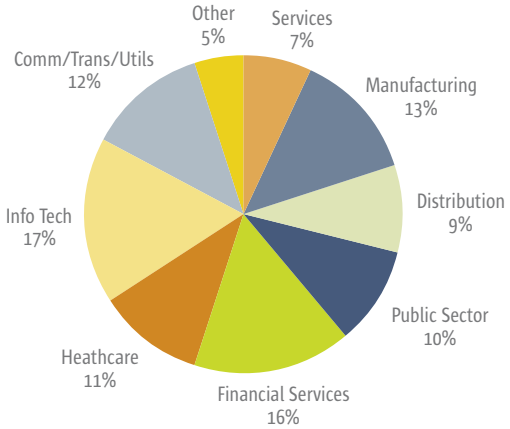
Forty-three percent of the participants were senior managers — predominately CIOs, CTOs, and VP levels within IT. Thirty-seven percent of the participants were middle managers in IT, and 20 percent were IT technical staff.

6.3.2 Industry

The most prevalent industry was information technology (17 percent of participants), closely followed by financial services (16 percent).

The 5 percent of the participants grouped as "other" were from agriculture or mining, or did not provide information about their industry.

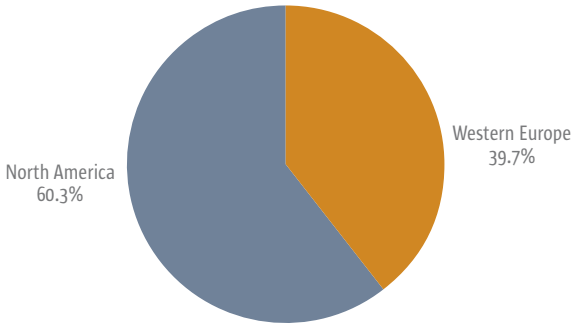
Figure A-3. Industry



6.3.3 Geography

About 60 percent of the participants were from North America (most from the USA). Forty percent were from Western Europe — evenly distributed between the U.K., France, and Germany.

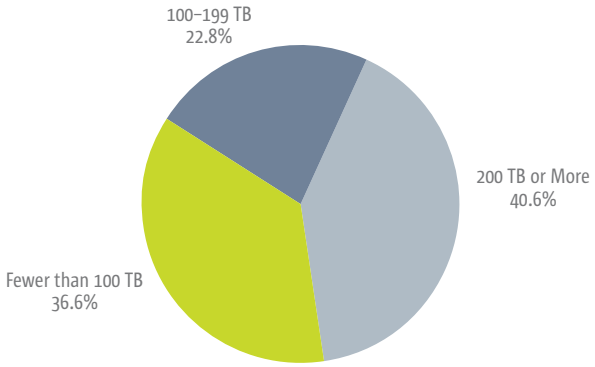
Figure A-4. Geography



6.3.4 Installed data center disk

Of the participants, 36.6 percent had fewer than 100 terabytes of data center disk installed, and only 4 percent had fewer than 25 terabytes; 22.8 percent of the participants had 100 to 199 terabytes installed, and 40.6 percent had over 200 terabytes.

Figure A-5. Data Center Disk Capacity



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