

The AssurENTSM Architecture:

A N O V E R V I E W

ENABLING SECURE, AUTOMATED STORAGE ASSURANCE FOR ENTERPRISE CUSTOMERS

EXECUTIVE SUMMARY

Managing the storage infrastructure is now a daunting challenge for IT organizations. The volume of data that must be stored and managed is staggering, and growing exponentially each year. The problem is amplified by the increasing complexity of storage technology, and ongoing staffing and resource limitations.

The challenge doesn't end there. Continuous availability is no longer a luxury in today's 24x365 business environment. Downtime is simply not acceptable, and traditional disaster recovery strategies don't meet the challenge. Companies also need storage solutions that can scale as their business grows, that are flexible enough to handle disparate platforms and unique applications, and that provide consistent service around the globe.

Storability was formed with a singular focus on offering unique, technology-leveraged, services that alleviate the challenges of storage management. The company's AssurENTSM architecture is a breakthrough in the storage industry. It provides an open, standards-based management and operation automation framework that allows the efficient delivery of services with the highest levels of quality, reliability, security, and scalability.

The architecture includes the physical components, software applications, network interconnections, and human interfaces that work together to enable highly customized, highly secure Storage AssuranceSM Services. Through these services, Storability delivers automated storage management, including 24x365 remote management of all aspects of its customers' storage infrastructures.

What makes the Storability model so unique is that customers' data resides on customer-controlled storage

systems, in customer-controlled locations, and is expertly managed by Storability's remote operations centers to deliver the highest levels of customer business value.

The AssurENT architecture supports the automation of routine tasks associated with the management and operation of a wide variety of storage devices – in virtually any configuration and location. It delivers automated management with a level of flexibility not supported by cookie-cutter approaches, yet without the attendant labor cost normally associated with custom solutions.

With the AssurENT architecture, Storability is able to support unlimited data centers, easily manage multi-vendor platforms and applications, and deliver the continuous availability companies demand.

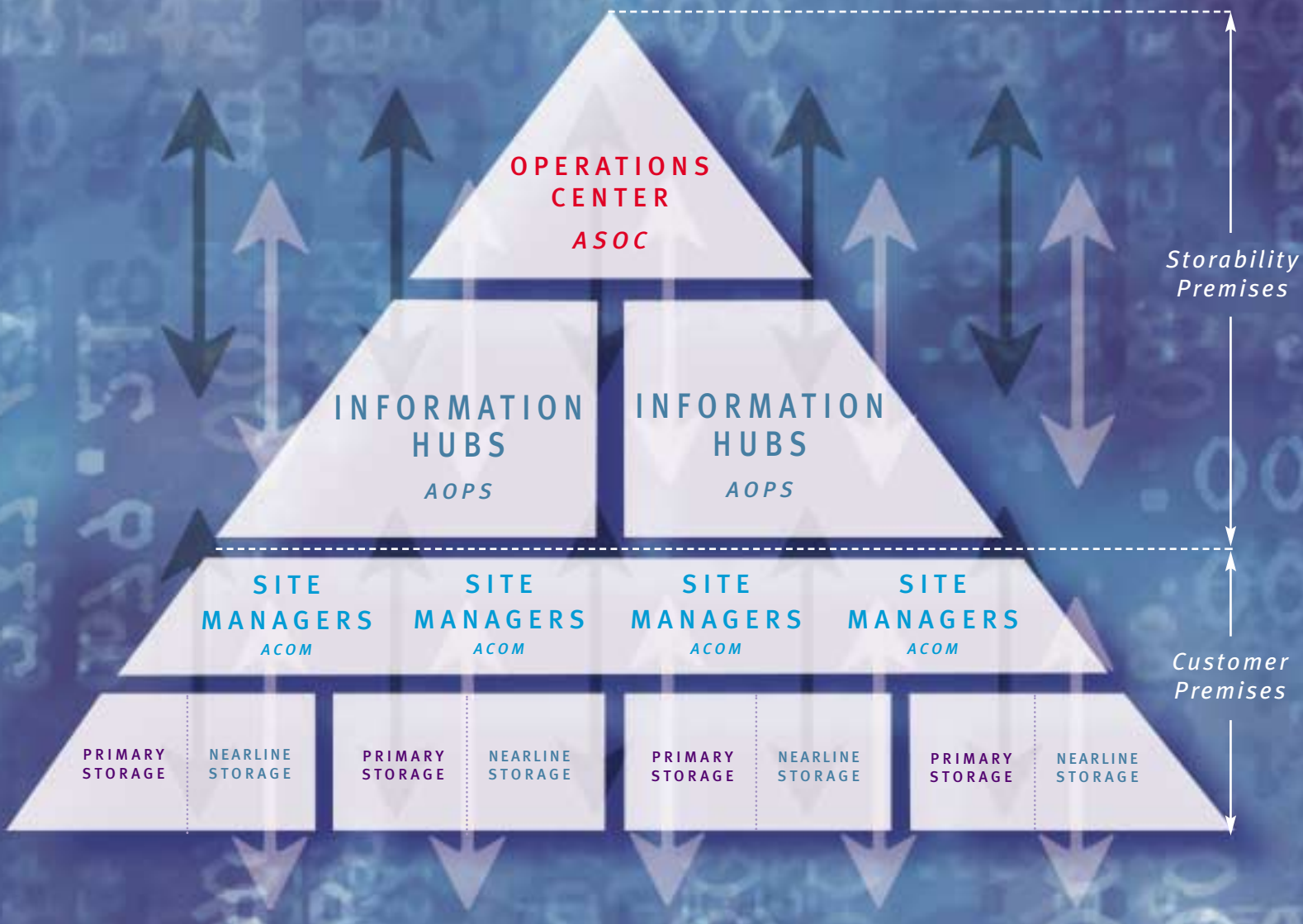
Incorporating best-of-breed technology with Storability-developed systems, the AssurENT architecture leverages development partners across the industry to quickly integrate improvements and product enhancements. This allows Storability's solutions to stay at the forefront of management technology evolution, while not delaying the introduction of business critical solutions today. It also provides a useful framework for understanding, building, and leveraging Storability's partner relationships.

This white paper describes the philosophy, goals, and general structure of Storability's AssurENT architecture. For additional information on how AssurENT can help your company conquer its storage challenges, please contact Storability at 508-229-1700.

KEY ARCHITECTURAL CONCEPTS

The AssurENT architecture is based upon four important concepts: expert oversight, intelligent automation, premises neutrality, and secure remote connectivity. These elements are fused within the architecture to deliver storage services in an entirely new way.

STORABILITY ASSURENT ARCHITECTURE *Component View*



EXPERT OVERSIGHT

A fully trained staff of storage operation experts oversees the AssurENT architecture from Storability's AssuredStorageSM Operations Centers (ASOCSM). These state-of-the-art facilities provide global views and instant on-demand drilldowns into every device at every customer site. Here, Storability oversees each component of the architecture – proactively managing operating customer storage systems, while providing customer care, product support, and event escalation services.

INTELLIGENT AUTOMATION

The core component of the AssurENT architecture is the AssuredStorageSM Operations Processing System (AOPS) – a highly evolved, rules-based artificial intelligence engine that allows routine management functions to be automated. For example, if a switch failure occurs, a re-initialization command automatically triggers. By leveraging the AOPS technology and Storability developed management agents, the architecture allows Storability experts to focus energy and attention on actions and procedures that require human intervention, such as any reconfiguration of the storage environment.

PREMISES NEUTRALITY

Storability believes that data should reside in close proximity to applications, providing the highest levels of availability, performance, physical security, flexibility, and control. The location of application servers is a business decision. Servers may reside in customer data centers, in leased space at Internet data centers, in archival facilities, or any combination of sites.

Regardless of physical storage location, each Storability managed environment is equipped with an AssuredStorageSM Communications and Operations Module



(ACOM). This small local device provides connectivity, security, and management access to the local storage devices. This device is, in essence, Storability's eyes, hands, and ears at the customer site.

SECURE REMOTE CONNECTIVITY

The AssurENT architecture delivers storage assurance services to any physical location with network connectivity. Because Storability shares its customers' concern regarding data security and control, the AssuredStorageSM Operations Network (AONSM) was created to provide a private, secure connection with redundancy between all elements of the architecture. Storability does NOT access customer data. Only status and control information is transmitted over the AON.

Together, the ACOM, AON, AOPS, and ASOC combine to form Storability's AssurENT architecture, the most sophisticated, open, standards based, storage management and operations service delivery system available today.

COMPONENT DETAIL

ASSURED STORAGE OPERATIONS CENTERS (ASOC)

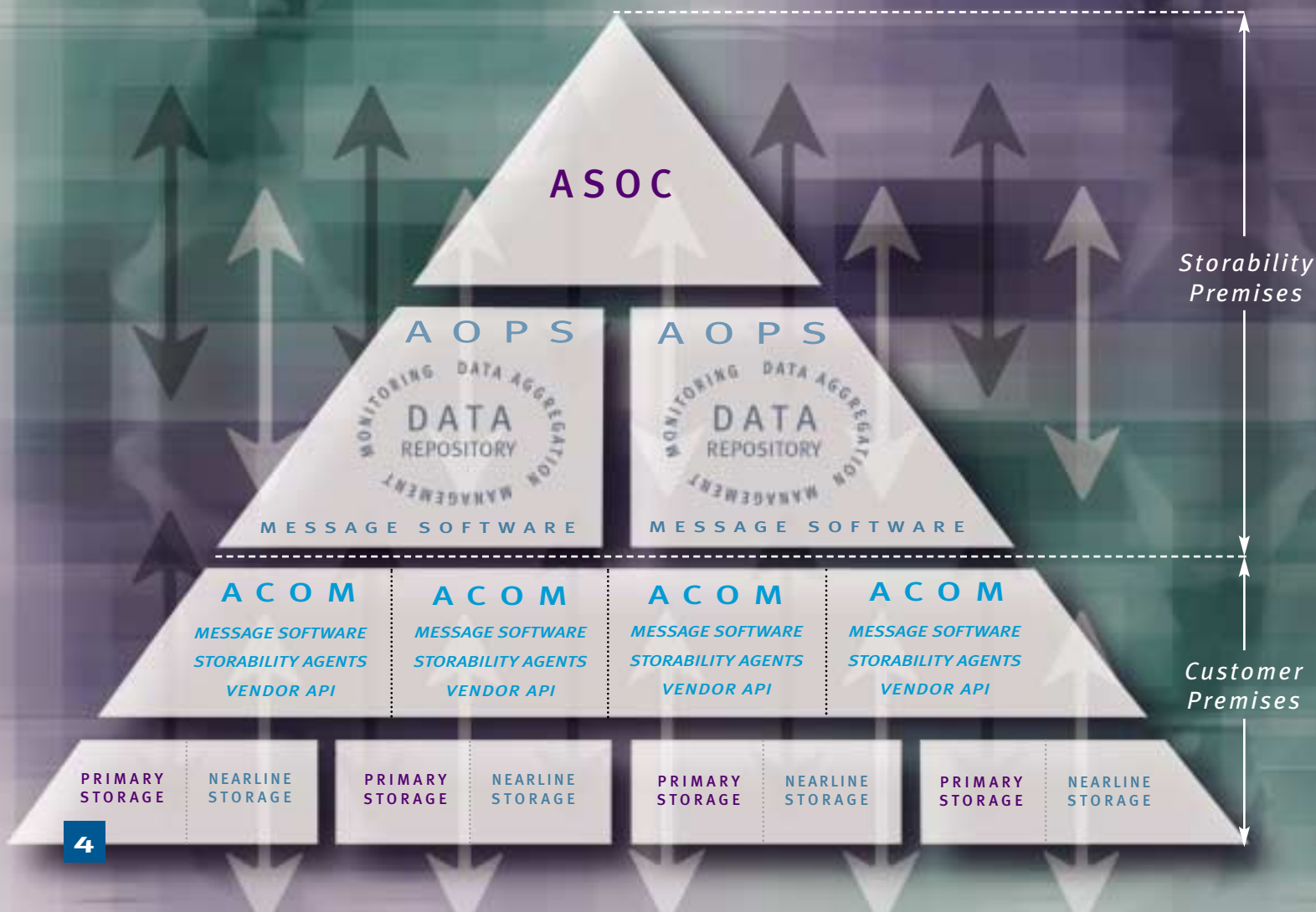
FUNCTION: Highest level of event escalation and problem resolution, oversight of AssurENT architecture components, customer support, process execution

STRUCTURE: Multi-location state-of-the-art operations centers, staffed by storage experts, following proven procedures, under the highest level of security, supported by extensive interoperability test laboratories

BENEFIT: Provides 24x365 management and oversight by highly skilled storage experts using best-of-breed technology and industry best practices and procedures

The ASOCs manage every aspect of storage infrastructure oversight and management, 24 hours a day, 7 days a week. This state-of-the-art center uses the latest technology to ensure day-to-day compliance to operational and performance specifications. As information is received from the AOPS, storage professionals manning the ASOC quickly

STORABILITY ASSURENT ARCHITECTURE *Application View*



respond according to clearly established policies and procedures, including best-in-class problem management and escalation processes.

ASSURED STORAGE OPERATIONS PROCESSING SYSTEM (AOPS)

- FUNCTION:** Continuously collects vital information on day-to-day operations, automates functions, and provides in-depth reporting and knowledgebase.
- STRUCTURE:** Application servers, proprietary applications, relational database, messaging system, rules engine
- BENEFIT:** Allows highly responsive management of disparate hardware platforms and software applications; ensures rapid resolution of problems

The AOPS uses a state-of-the-art rules based artificial intelligence system to process thousands of messages simultaneously. A continuous stream of messages containing status and control information is intelligently routed between ACOM and ASOC locations. The AOPS homogenizes the data streams from many heterogeneous devices, storing information on configuration, condition, performance, capacity, availability, and security in a centralized knowledgebase. Routine events trigger preprogrammed automated responses while extraordinary situations are immediately escalated to highly trained ASOC staff for assessment and intervention as necessary. The AOPS has the capability to provide authorized users with real-time status monitoring and is the data source for reporting.

ASSURED STORAGE COMMUNICATIONS AND OPERATIONS MODULE (ACOM)

- LOCATION:** Co-resident with storage devices under management
- FUNCTION:** Provides on-site monitoring and operation for local storage devices
- BENEFIT:** Enables automated remote management, monitoring, and reporting in conjunction with other elements of the AssurENT architecture

The AssuredStorage Communication and Operations Module (ACOM) is the platform that enables Storability to remotely manage and produce reports on customers' storage infrastructures from its ASOCs. The ACOM contains proprietary agents developed by Storability that interface with a wide variety of storage devices via the device manufacturer's application program interface (API). The ACOM receives command and control from the AOPS via the AON; however, the ACOM is a standalone device capable of logging events and operating without connectivity to the AON for extended periods. Failure of the communication network or the ACOM does not affect the underlying storage systems.

To ensure customer isolation, each ACOM is assigned an individual encryption key. Should any other system attempt to gain access to the ACOM, denial is immediate.

ASSURED STORAGE OPERATIONS NETWORK (AON)

- FUNCTION:** Secure connectivity for management of customer's environment
- STRUCTURE:** A specific network of ASOCs, AOPS and ACOMs
- BENEFIT:** Network redundancy ensure continuous availability

The AssuredStorage Operations Network is a highly secure, redundant, multi-path, multi-provider, private network connecting ACOM, AOPS, and ASOC systems. A highly evolved messaging system ensures complete end-to-end routing of status and control information. To ensure this connection is completely secure, the AssurENT architecture uses dedicated routers and establishes an industry standard IP Security (IPSec) connection, which serves as a virtual private connection. In the highly unlikely scenario of data being intercepted, encryption would render it unreadable and unusable.

ADVANTAGES OF THE ASSURENT ARCHITECTURE

CONTINUOUS AVAILABILITY

The AssurENT architecture is designed to meet customer requirements for continuous availability. The outage windows that used to exist in the evenings or over the weekend no longer exist. Companies must keep vital applications up and running 24x365. Storability's architecture delivers continuous availability by:

- Employing a redundant, highly modular, active/active site design;
- Implementing a "plug-and-play" style environment that allows management and maintenance tasks, such as adding new technology or device repairs, to be conducted without bringing down any other components of the infrastructure.

HIGHLY SECURE STORAGE MANAGEMENT

With the AssurENT architecture, the customer's data always stays safely in a customer-controlled environment. The architecture is based on industry best practices, and is developed by a team of experts with extensive experience in a range of industries where security is an absolute priority, including financial services, healthcare, and network service providers. All storage solutions are rooted in the customer's own internal storage policies, enhanced by Storability's expertise. The AssurENT architecture features highly secure end-to-end connections that transfer only management and control information concerning the storage devices themselves.

GREATER CUSTOMER INTERACTION AND CONTROL

The AssurENT architecture facilitates customer interaction through the AssuredStorageSM Navigator, its unique web-based portal. The AssuredStorage Navigator helps customers stay in control of their storage infrastructure by allowing them to view vital statistics, access management reports, initiate chargebacks and billing, and much more. For example, customers can quickly and easily find out what the current utilization is for a storage subsystem, how much capacity is being used by a particular department, whether backups ran successfully, how the SAN is performing, and much more.

In addition to providing valuable information on operations, customers can use the AssuredStorage Navigator to initiate activity requests that can be immediately acted upon by engineers in the ASOC.

SCALABILITY AND FLEXIBILITY

The modular style of this architecture means Storability can support unlimited data centers. The architecture allows Storability to add new customer data centers or new products almost immediately, with absolutely no impact on their customers or operations.

In addition, the modularity gives the architecture tremendous flexibility to support disparate hardware and software platforms. While the AssurENT architecture leverages best-of-breed solutions, it is flexible enough to support multiple versions of the same technology. When a vendor makes an upgrade or launches a new product, the AssurENT architecture can quickly incorporate the new version on a global scale, but will continue to support the older version as well. This gives customers greater flexibility in determining how and when they wish to implement new technology, without raising concerns about impacting operations.

GLOBAL REACH

In a global economy, companies need to know that their storage infrastructures will be operated and managed consistently, regardless of where they are located. The global design of the AssurENT architecture allows Storability to easily support data centers around the world.

UNLOCK THE VALUE OF STORAGE TECHNOLOGY

Storage technology today is incredibly powerful, with valuable capabilities that often go untouched by end users because most companies lack the time, the knowledge, or the resources to maximize the potential of the systems. The open AssurENT architecture leverages best-of-breed technology to ensure that companies get the full value of the robust systems in which they have invested.

THE ASSURENT ARCHITECTURE ROADMAP

EXISTING CUSTOMER IT OPERATIONS

Each company employs its own management processes, people, and technology. Inefficient redundancies exist, procedures are run inconsistently, and complex technology requires more time, knowledge, and resources. Today, storage management is typically done this way.

The AssurENT architecture Roadmap presents Storability's vision to move storage operations and management from a manual process to one that provides superior management through intelligent automation. Storability managed services will evolve to include these distinct points:

AUTOMATED REMOTE MANAGEMENT

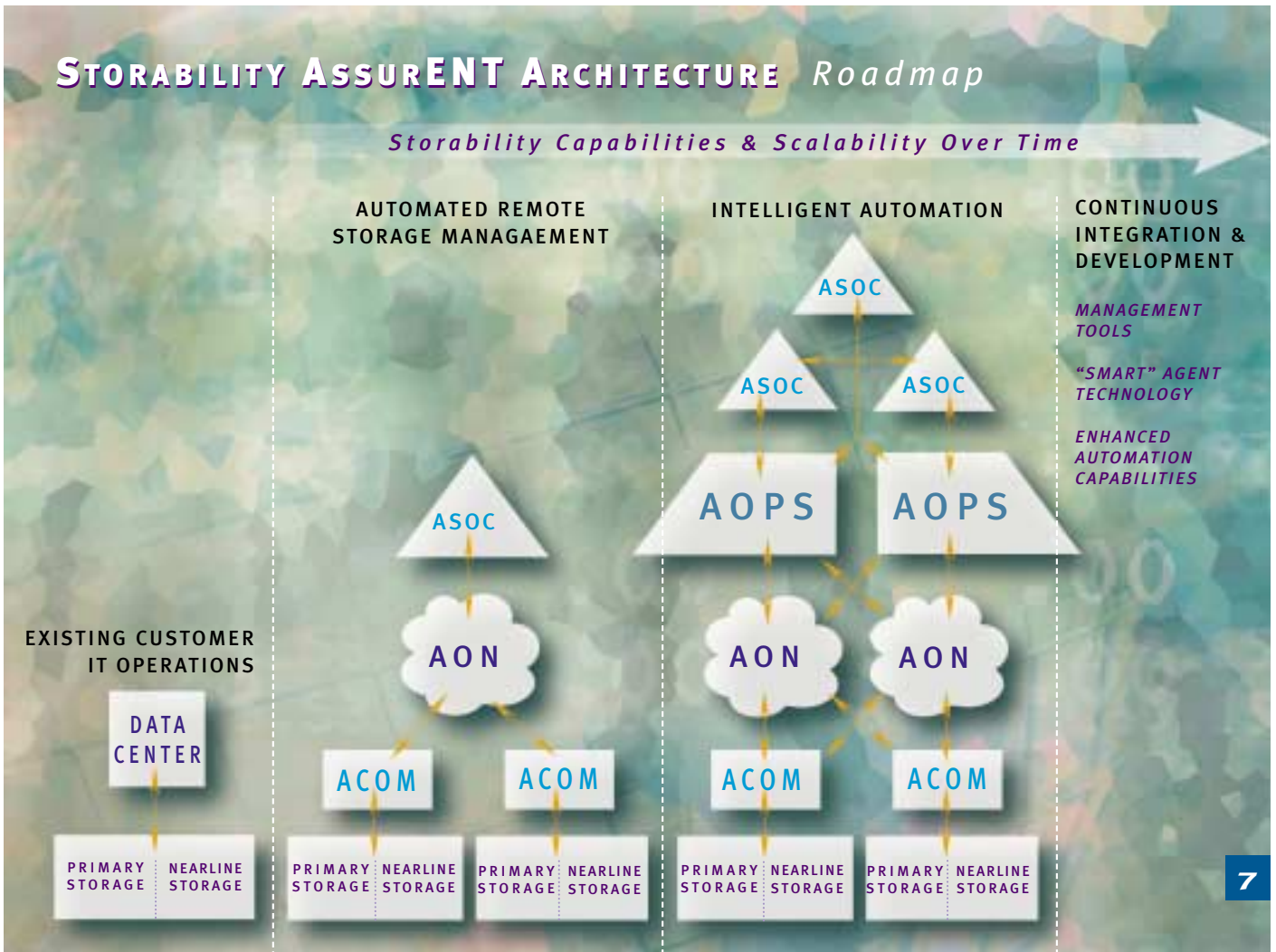
The ASOC acts as the central management station. Central databases and discovery tools increase efficiency. Data is gathered from disparate hardware and software platforms and "homogenized" for delivery to the ASOC. Routine low level tasks -- typically event monitoring and reaction -- can now be automated by Storability developed management

agents located throughout the AssurENT architecture.

INTELLIGENT AUTOMATION

At this stage of the AssurENT roadmap, manual efforts are solely focused on managing the architecture's components, versus managing the customer's storage devices. Automation tools support most tasks around customers' storage devices with constant updates and alerts visible. ASOC engineers instead focus on planned interventions such as new site setup, customer site expansion/reconfiguration, cataclysmic events, and improved proactive customer engagement and support.

The AssurENT Architecture is an on-going development effort with a goal of continuous enhancement. Next stage efforts focus around management tools, smart agents, and automation driven by customer requirements. Storability's architecture moves IT storage operations from manual processes to intelligent managed automation.



SUMMARY

Clearly, the storage challenges facing IT organizations are not going to go away. Data volumes will continue to grow, storage technology will become even more complex, and internal resources will always be stretched to the limit. Storability's AssurENT architecture offers companies the best solution for effective, efficient, and secure storage management.

Storability's AssurENT architecture provides an open, standards-based, management and operation automation framework that allows the efficient delivery service with the highest levels of quality, reliability, security, and scalability. Through this architecture, Storability provides professional, efficient, automated storage management services directly to the customer environment. The AssurENT architecture delivers:

- The continuous availability demanded by today's 24x365 business operations;
- Greater security for vital corporate data because it remains at a customer-controlled location;
- Enhanced customer interaction, and automation controlling the storage infrastructure;
- Greater scalability and flexibility as the customer's business needs evolve;
- Consistent management and operations worldwide;
- The power to unlock the full potential of the customer's storage systems.

The true power of the AssurENT architecture can be found in its four key concepts at its core: expert oversight, intelligent automation, premises neutrality, and secure remote connectivity. By bringing these important elements together, Storability has created an entirely new approach to storage management that finally addresses the critical needs of IT organizations around the world.

The Storability logo, the A and design, AssurENT, AssuredAssessment, AssuredOperation, AssuredStorage Operations Network, AssuredStorage Operations Processing System, AssuredRestore, AssuredStorage, AssuredStorage Navigator, AssuredStorage Communications and Operations Module, AssuredStorage Operations Center, AssuredVolume, and Storage Assurance are service marks of Storability, Inc. Copyright 2001, Storability, Inc

ABOUT STORABILITY

Storability is the world's first Storage Assurance Provider, delivering automated storage management solutions on a pay-per-service basis. Storability offers a dramatically superior solution that leverages new technologies to address customer concerns for security, availability, scalability, and flexibility.

Storability's storage solutions allow customers to focus on their strategic missions, confident in the knowledge that vital corporate data is secure and their storage infrastructure is in the hands of the best professionals in the industry.

Through its unique Storage AssuranceSM Services and world-class AssuredStorage Operations Centers, Storability offers:

ASSUREDOPERATIONSM

Delivers world-class storage system monitoring, configuration, tracking, and reporting for storage infrastructures 24x365

ASSUREDVOLUMESM

Delivers tailored, enterprise-wide storage capacity and services that provide optimal storage flexibility by allowing modification of key characteristics such as capacity, performance, availability, and recoverability

ASSUREDRESTORESM

Safeguards valuable corporate data by remotely managing all backup and restore functions

ASSUREDASSESSMENTSM

Provides the expertise, the knowledge, and implementation plans to create an open, scalable storage infrastructure that meets your current and future requirements

For more information on the AssurENT architecture or Storability's automated storage management services, call (508) 229-1700 or visit www.storability.com

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