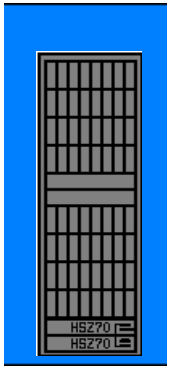
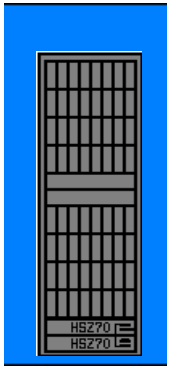


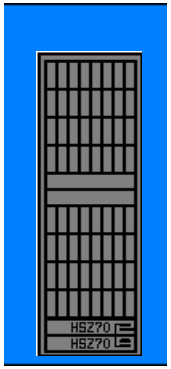
HP's Enterprise Network Storage Architecture (ENSA) Vision



Overview

Introducing the HP Enterprise Network Storage Architecture which:

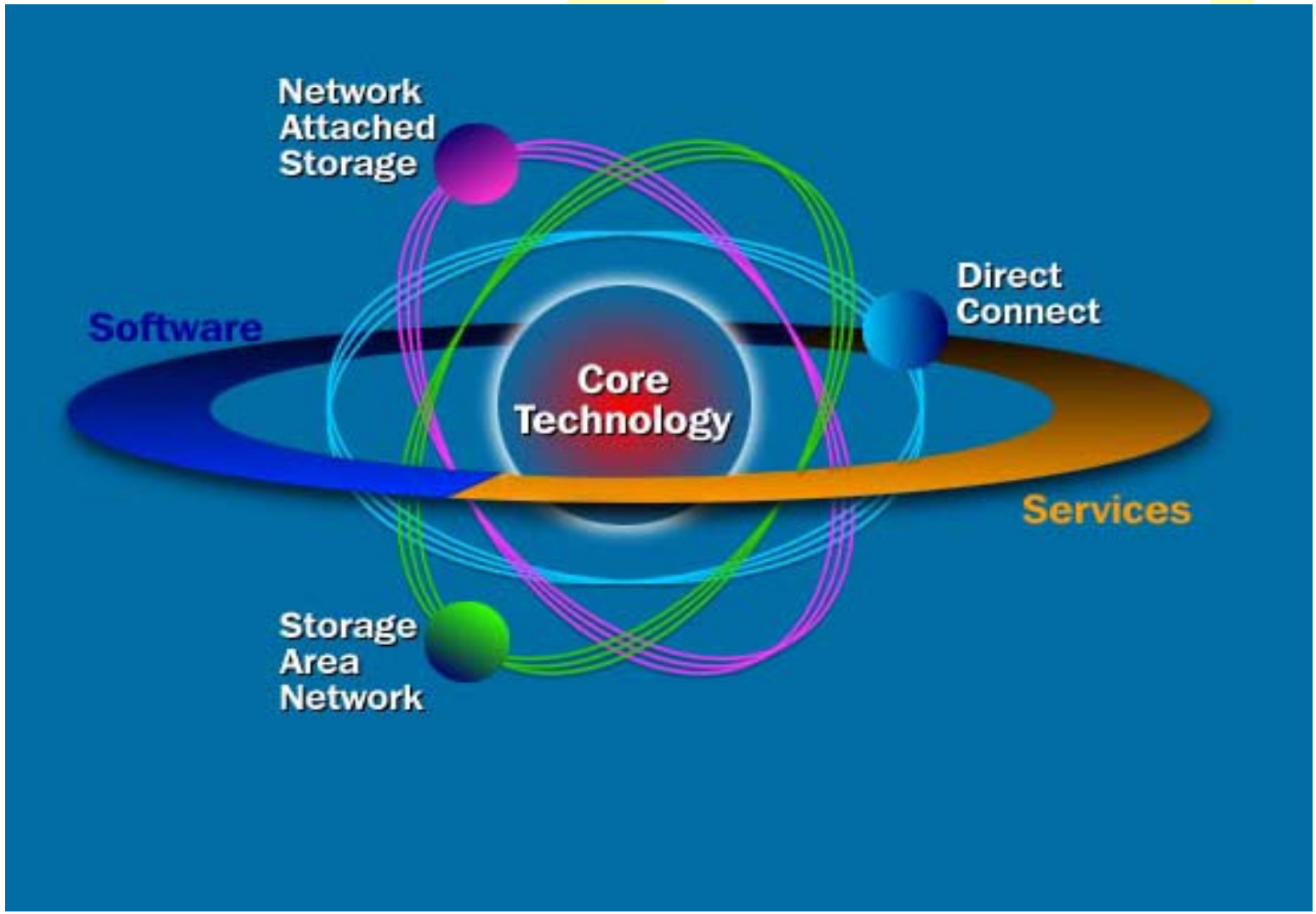
- Virtualizes the data storage environment
- Distributes storage where customers need it and centrally manages it where they want it
- Enables on-the-fly expansion and reallocation of storage
- Protects customer investment in current technology



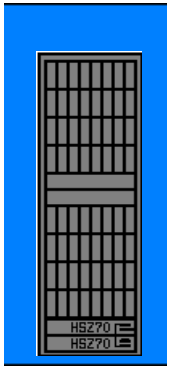
Storage is a HP Priority

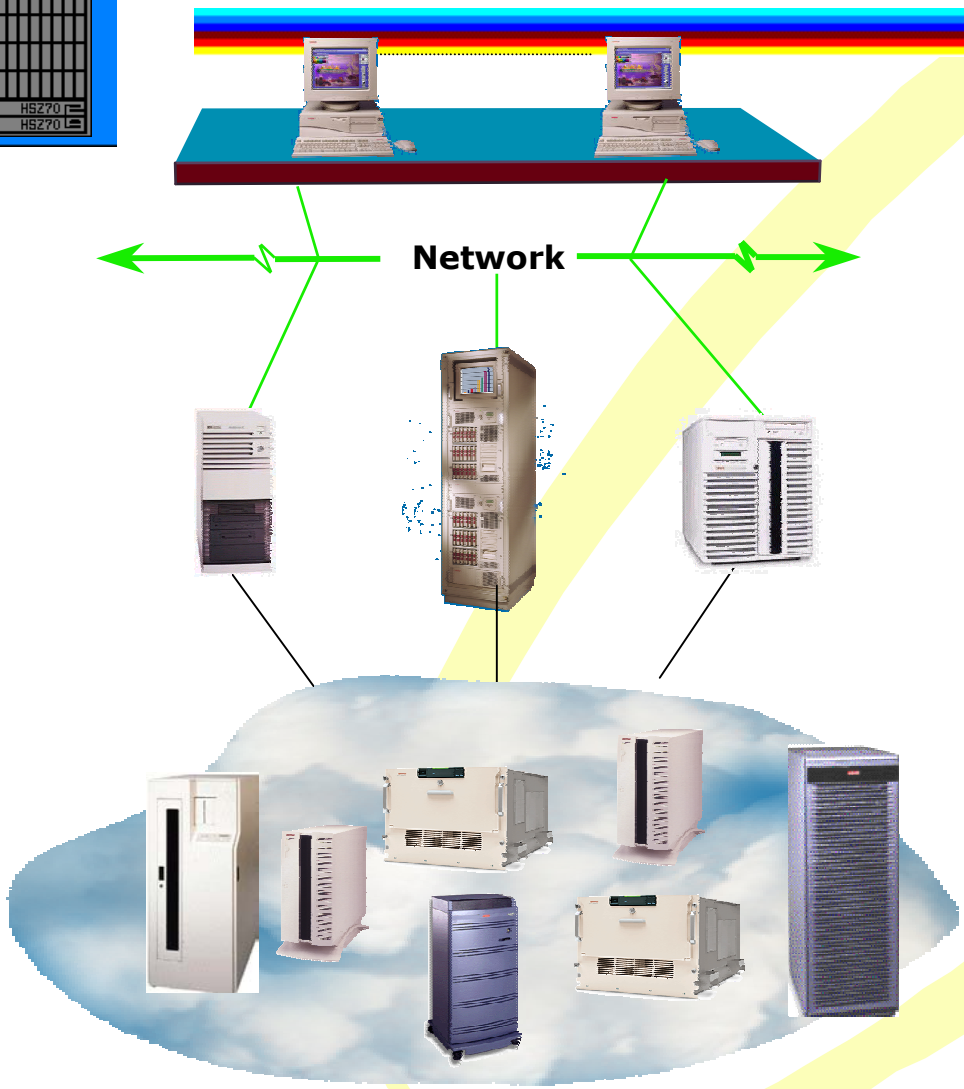
- HP is the #1 Vendor in Multi-User Storage
- Customers demand total Enterprise offerings from HP
- Open Standards Computing Commitment
  - Initial Developer of RAID
  - Founding Member of the RAID Advisory Board
  - Active Member of the SCSI ANSI Standards Committee
  - Leading the Development of Fibre Channel Standards and Improved Interoperability - ANSI, FCA, FCLC, SNIA
  - Developed Tachyon Chip
  - Jointly developed GBIC standard with Sun and Amp

Enterprise Network Storage Architecture



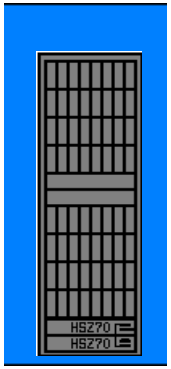
Enterprise Network Storage Architecture Value Proposition





- Unbounded Performance and Capacity
  - Virtual pooling of all storage assets
- Unprecedented Flexibility
  - On the fly expansion and reallocation
- Simplified Management
  - Reliable Access and Control of Distributed Resources

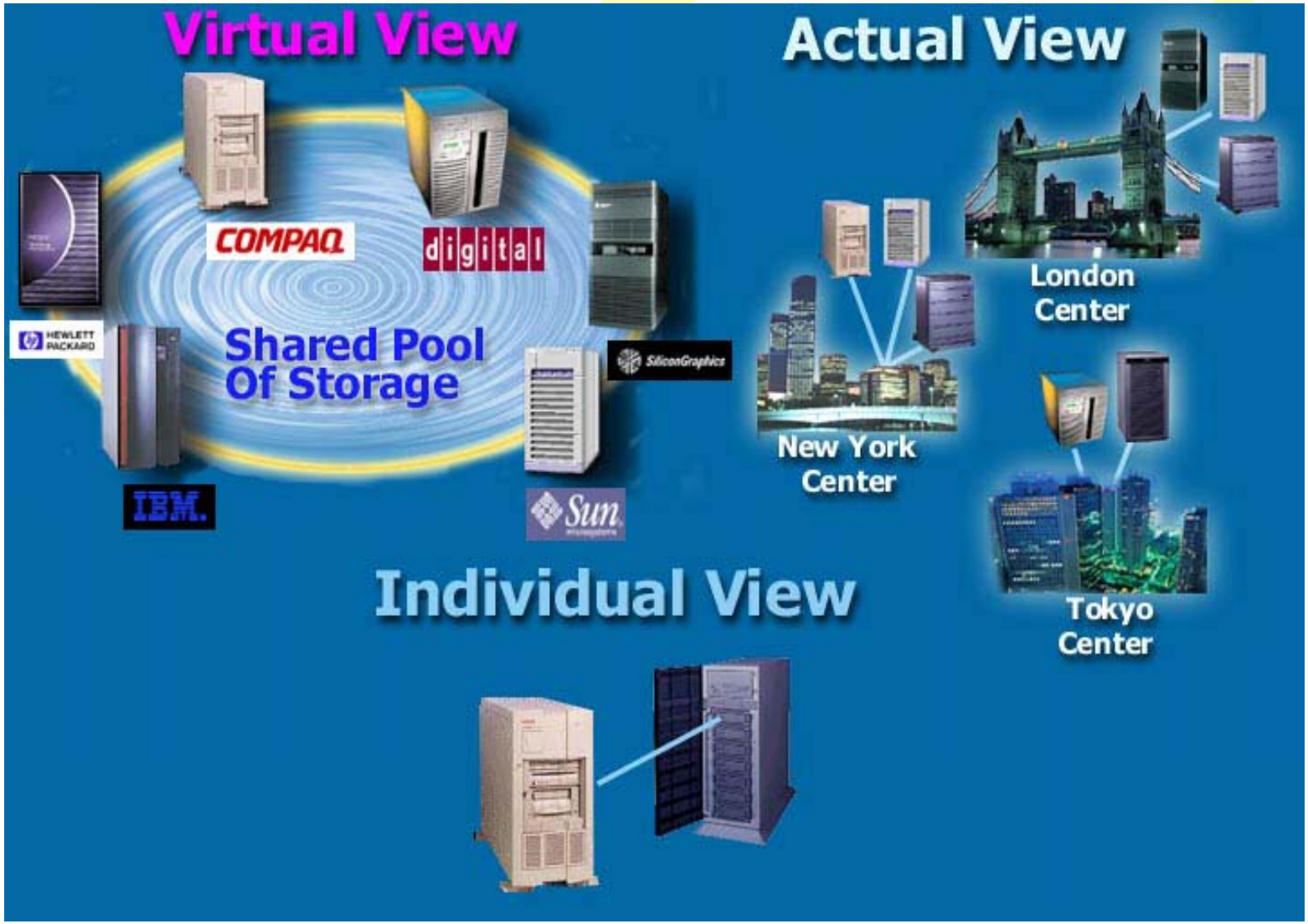
= Lowest Total Cost of Ownership

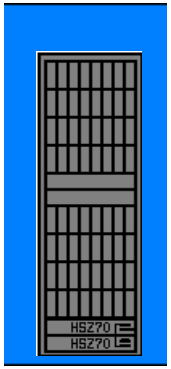


Enterprise Network Storage Architecture Implementation

- Delivering the Benefits through:
  - Storage Virtualization
  - Dynamic Scalability
  - Data Replication
  - Simplified Management
- Bringing Industry Standards to Storage
- Partnering with Leading Hardware and Software Providers

Storage Virtualization



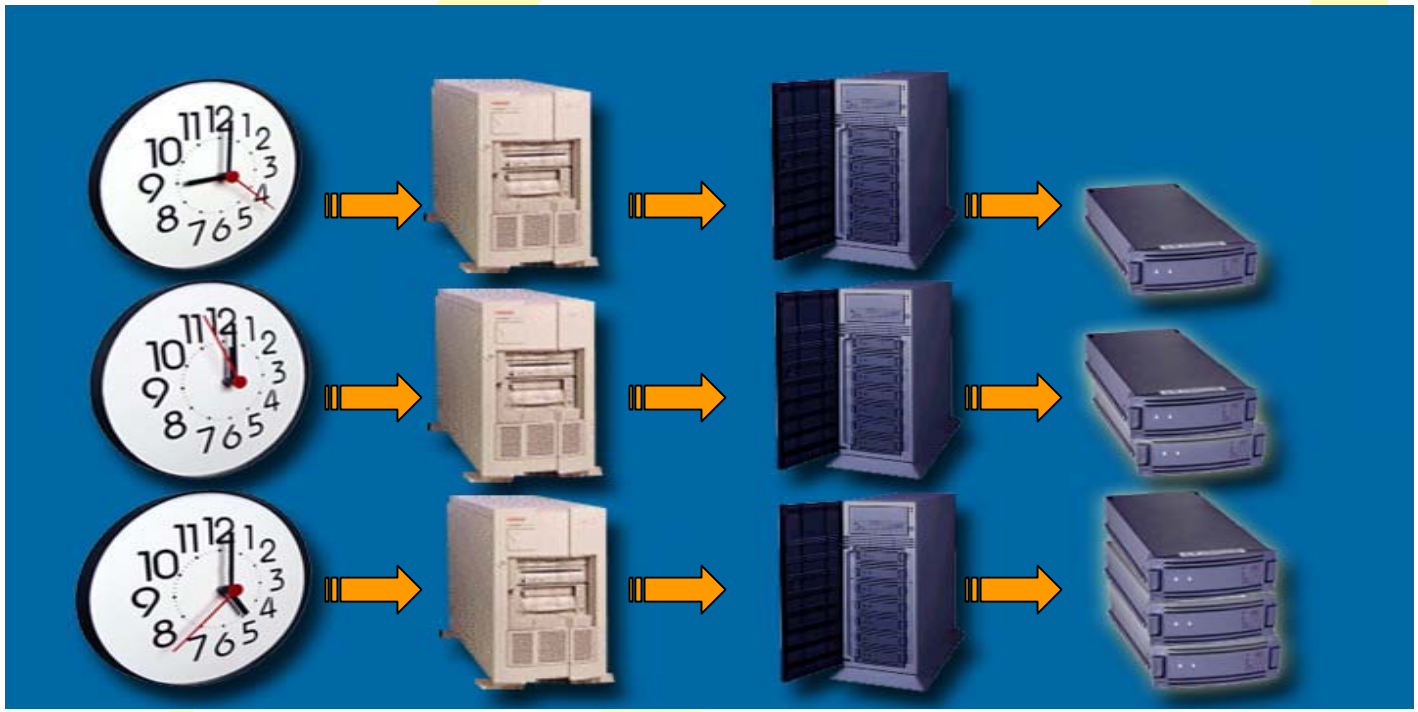


Dynamic Scalability

- Storage allocated from a single common pool
- Scales online from gigabytes to petabytes and beyond
- Capacity easily acquired and added to the pool as needed

Data Replication

- Instant, continuous replication of data
- Rapid user-initiated restores
- Enables quick and easy backup



Simplified Management

- Centralized management of distributed resources
- Unified management of primary and secondary storage
- Policy-based management
  - dynamic allocation
  - automatic redeployment
  - intelligent data replication and protection
  - performance balancing

ENSAextended and Adaptive Infrastructure

Adaptive Infrastructure	ENSAextended attributes		how ENSAextended delivers
Automated and intelligent management	Controllable		• Active Intelligent Management • Life Cycle Data Management • Centralized management of heterogeneous networked storage • Business-rule driven, quality-of-service • Self-tuning
Continuous and secure operations	Resilient		• Self-healing, disaster tolerant, and resilient storage infrastructure • Remote monitoring and management • Data replication, protection, and rapid restoration • LUN masking and security
Dynamic resource optimization	Extensible		• Modular, extensible, and utility-based network storage • Array-, appliance-, and fabric-based virtualization • Storage provisioning • Utility Data Center

ENSAextended

business view

business applications

active intelligent management

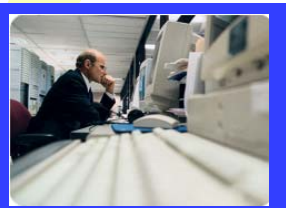
application integration

data services

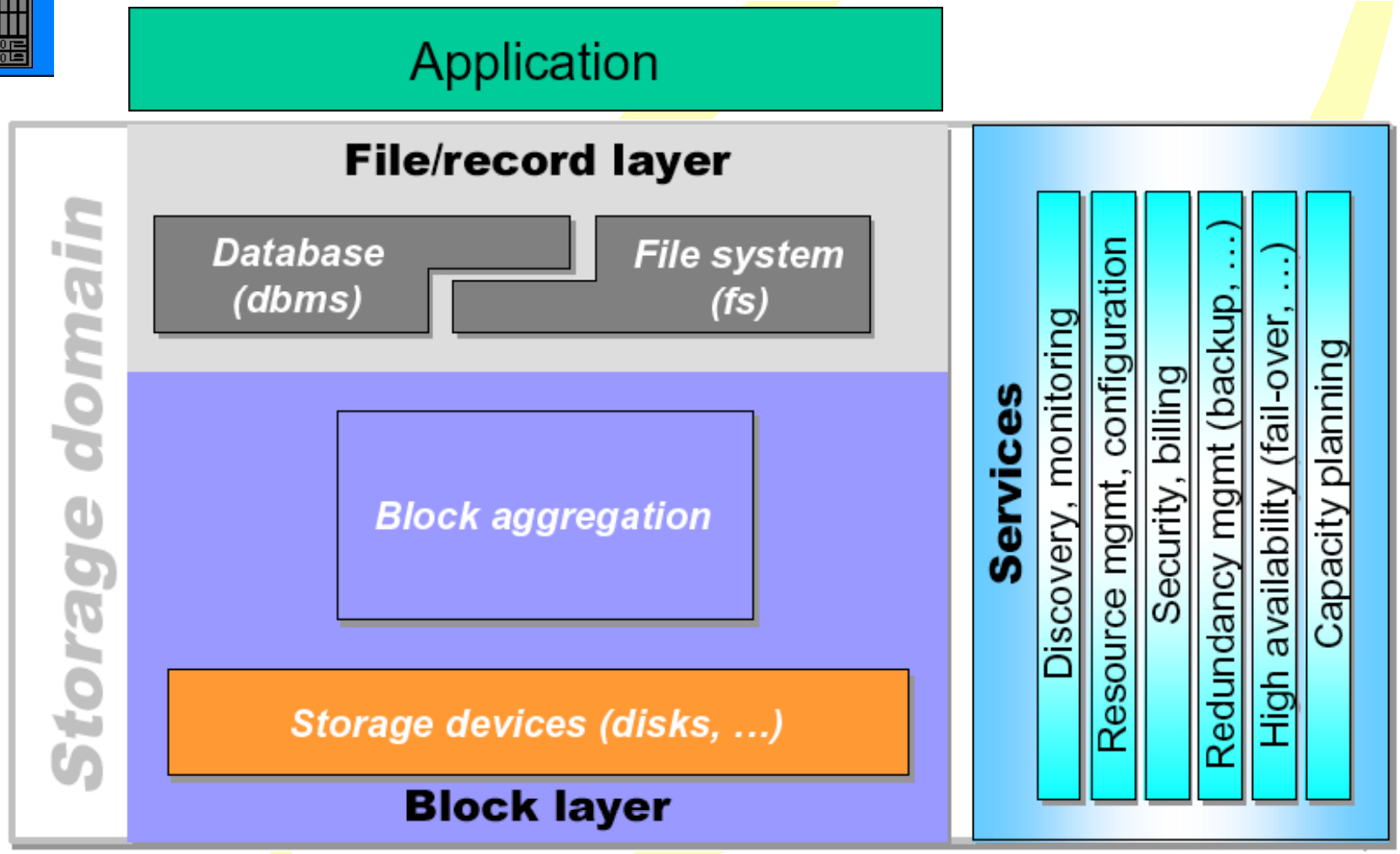
virtualization

networked storage

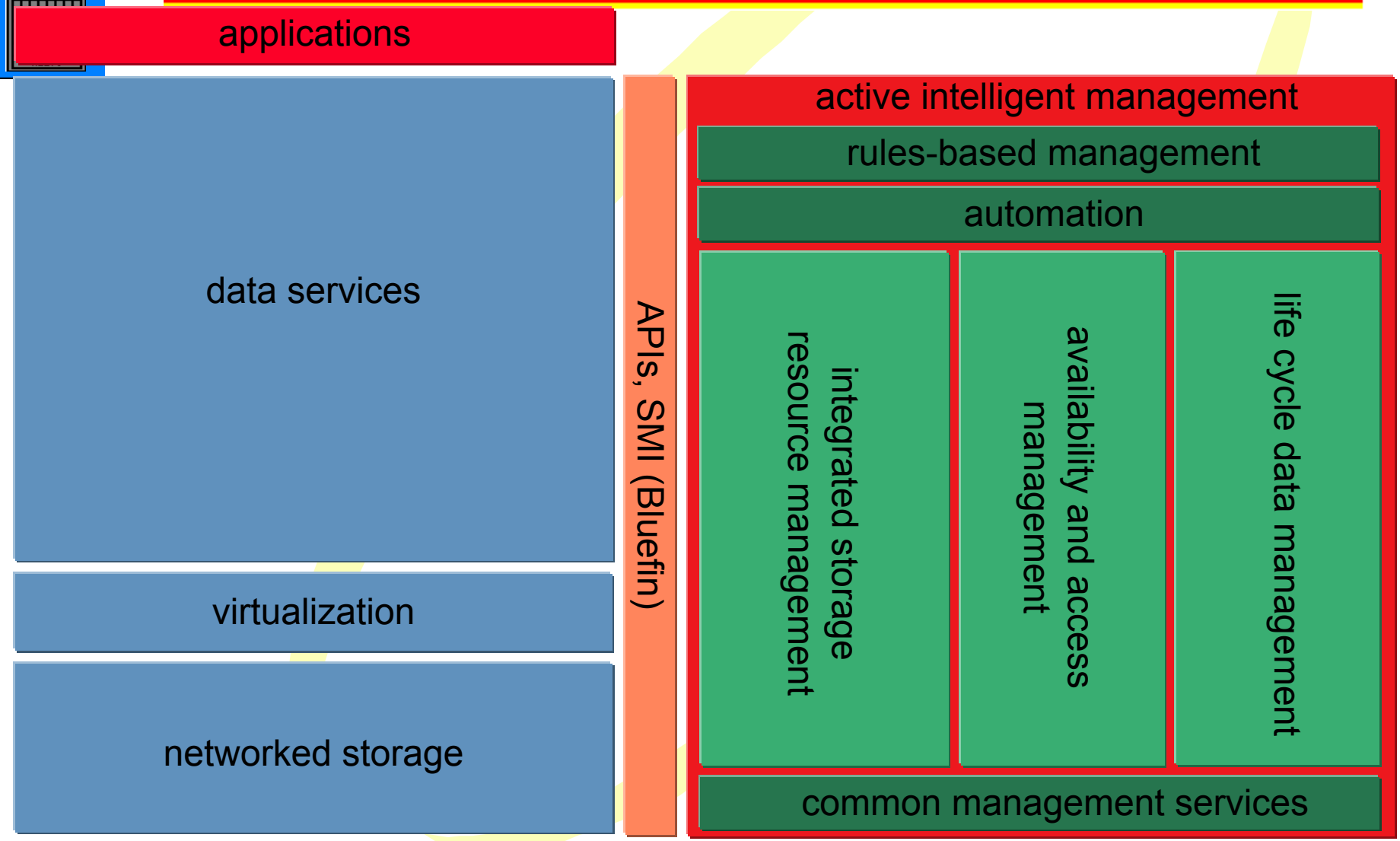
storage administrator view



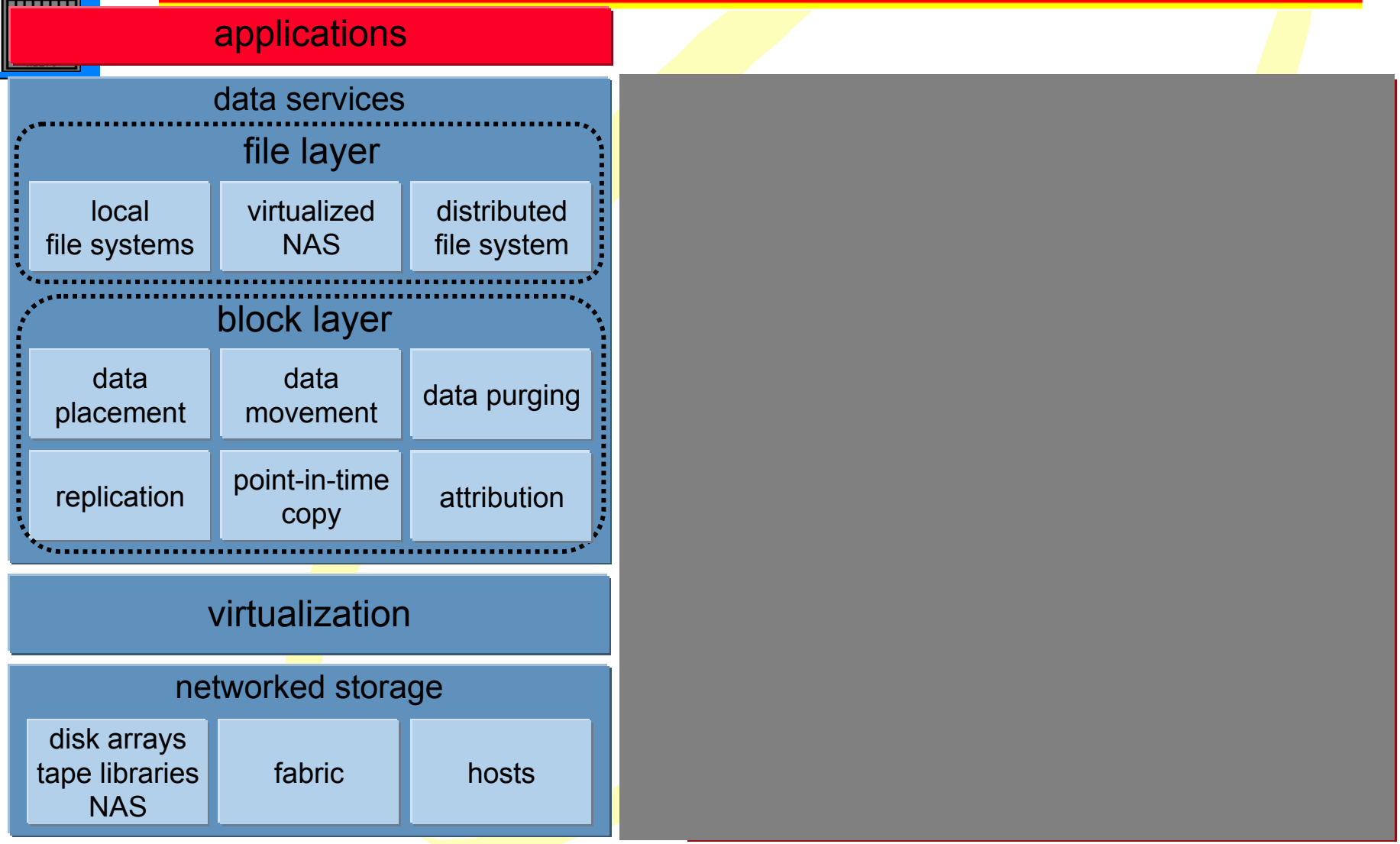
SNIA Shared Storage Model



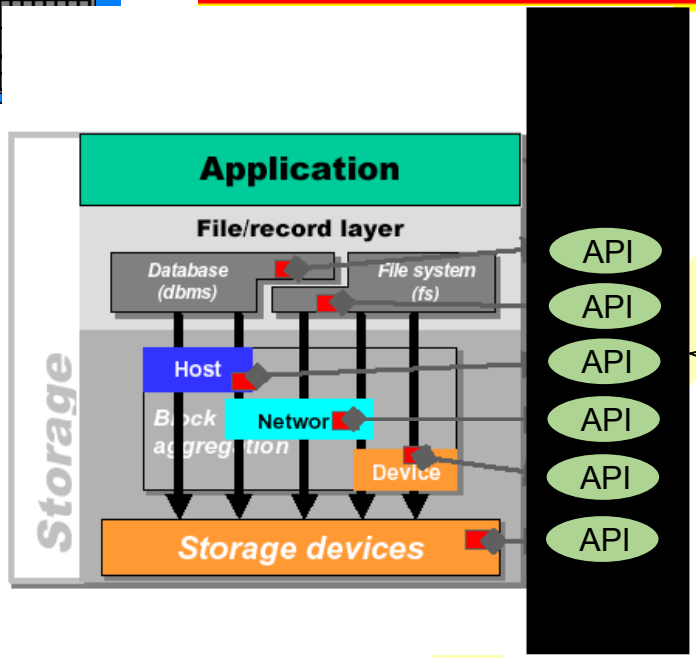
ENSAextended architecture

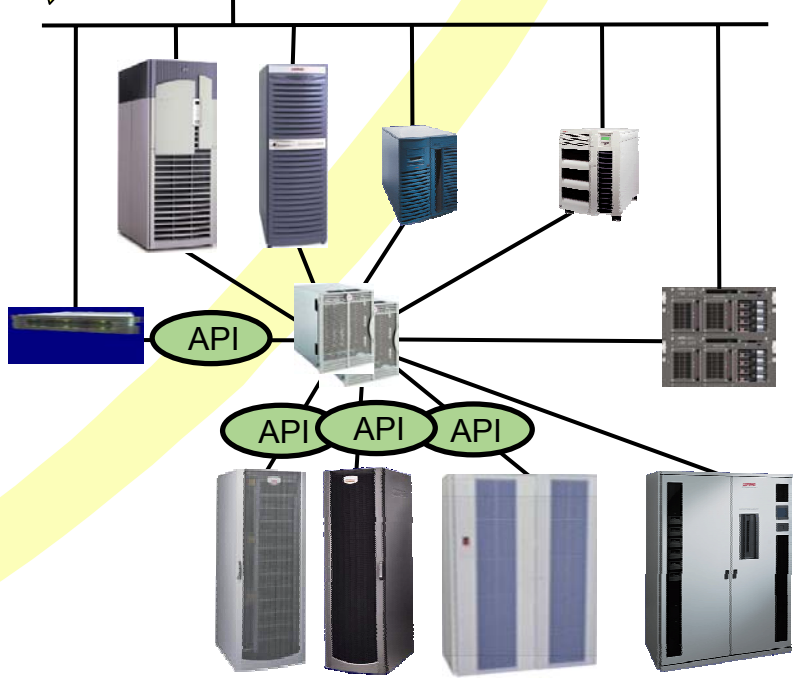


ENSAextended architecture: data path



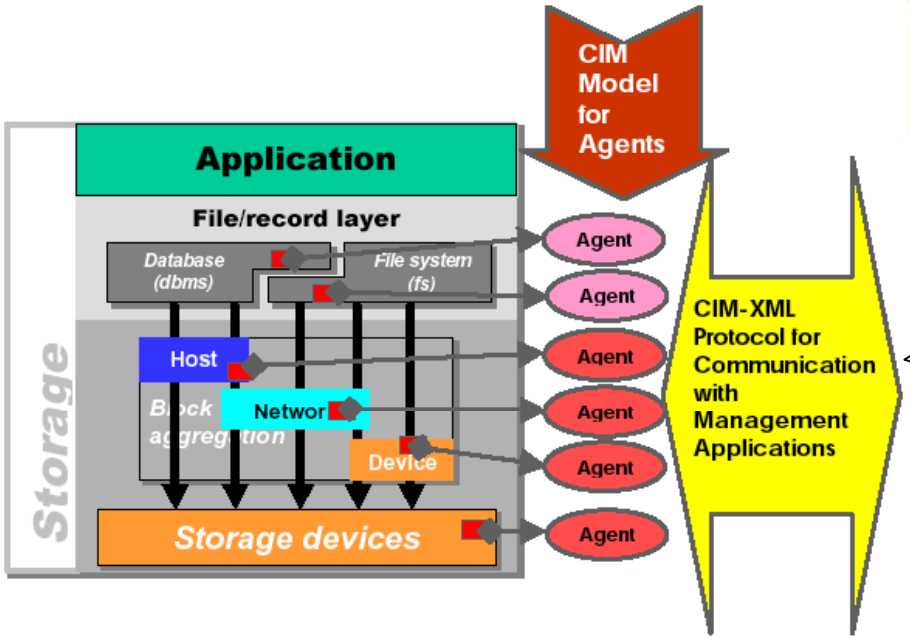
Today: API exchanges

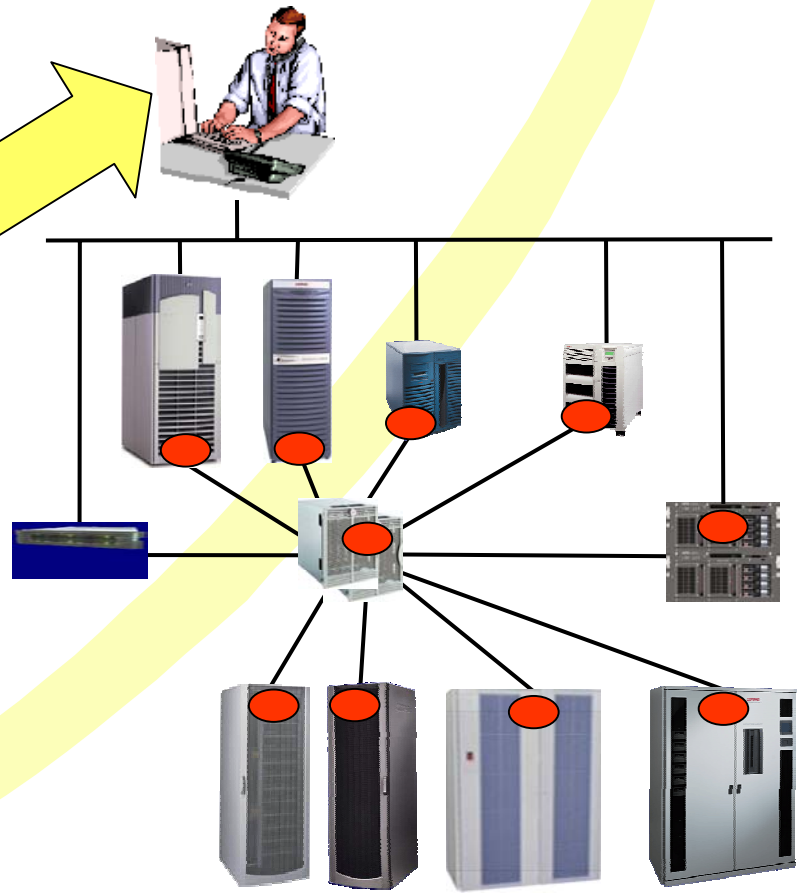




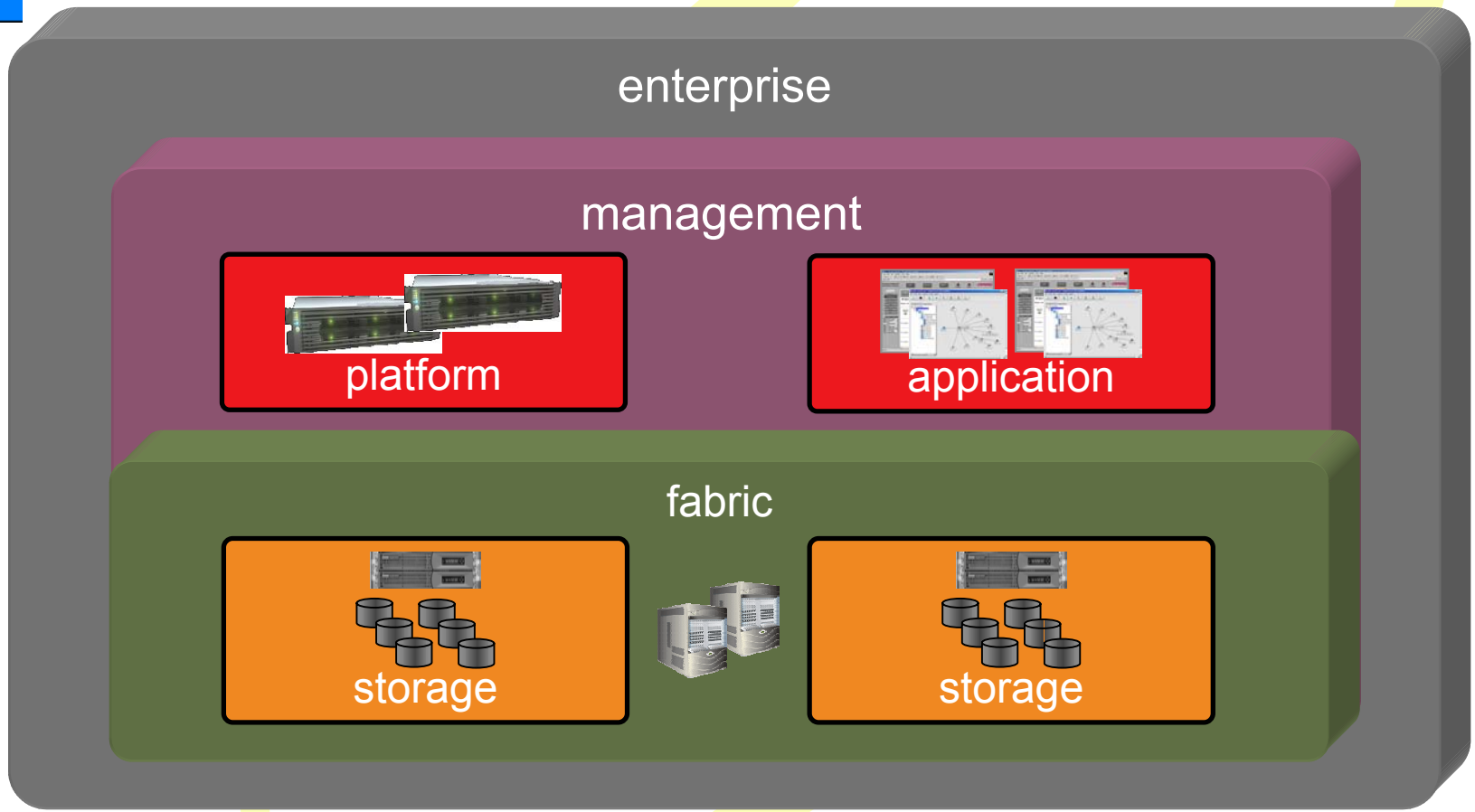
APIs and MIBs provide some management and monitoring capabilities

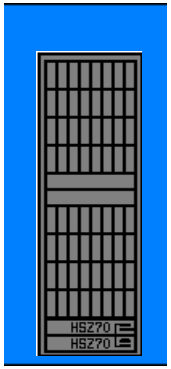
Tomorrow: SMIS





Resilience throughout the storage utility





How ENSAextended improves QoS

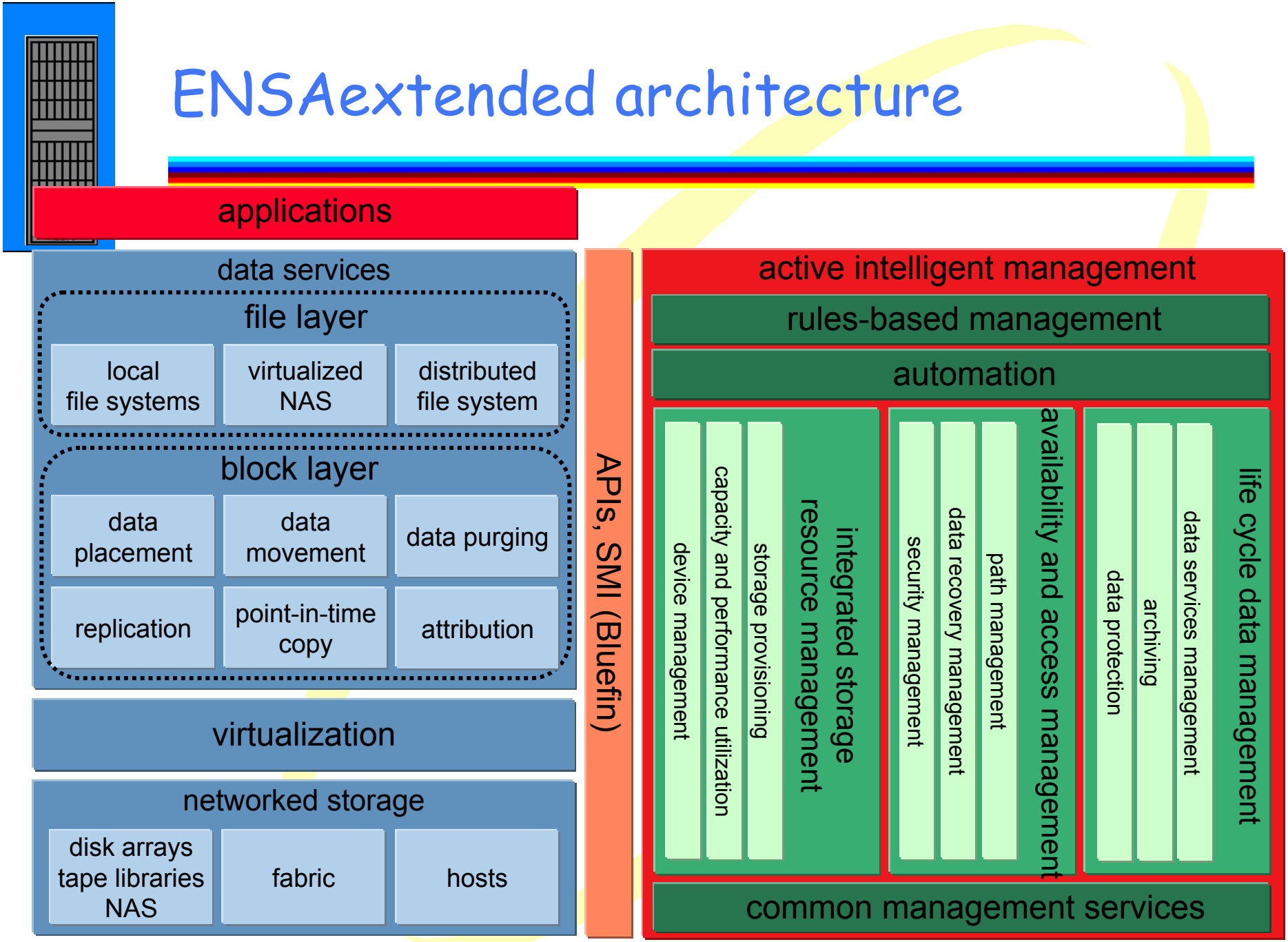
Quality of Service before ENSAextended

- Hardware redundancy
- Manual resolution of management software failure
- Manual reconfiguration in response to changing needs
- Host-based path load balancing
- Manual configuration and data migration

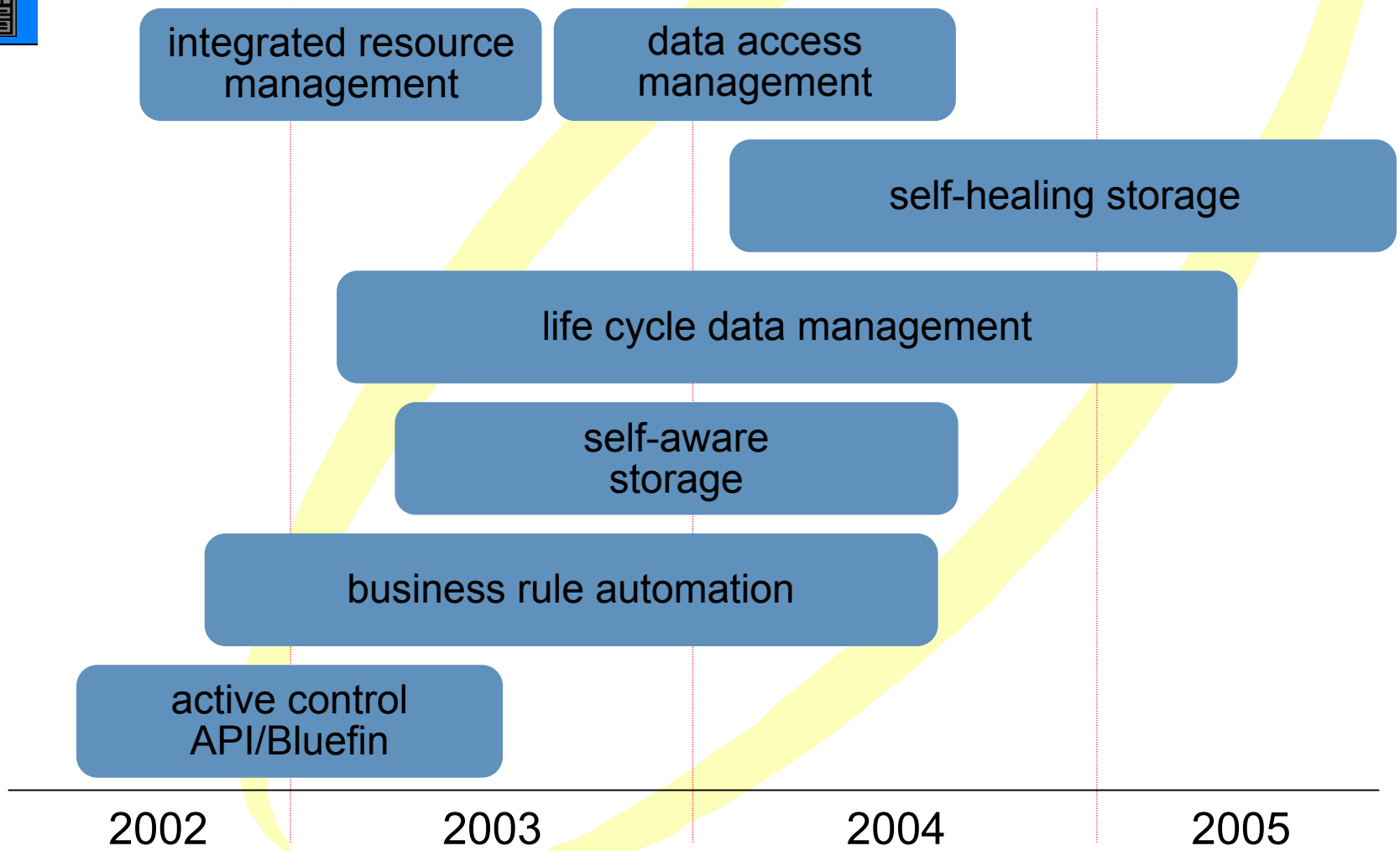
Quality of Service with ENSAextended adds…

- Self-healing fabric
- Resilient, self-healing management software
- Fabric-wide storage pool, storage provisioning
- Fabric-based, dynamic load balancing
- Automatic pool expansion and dynamic data migration

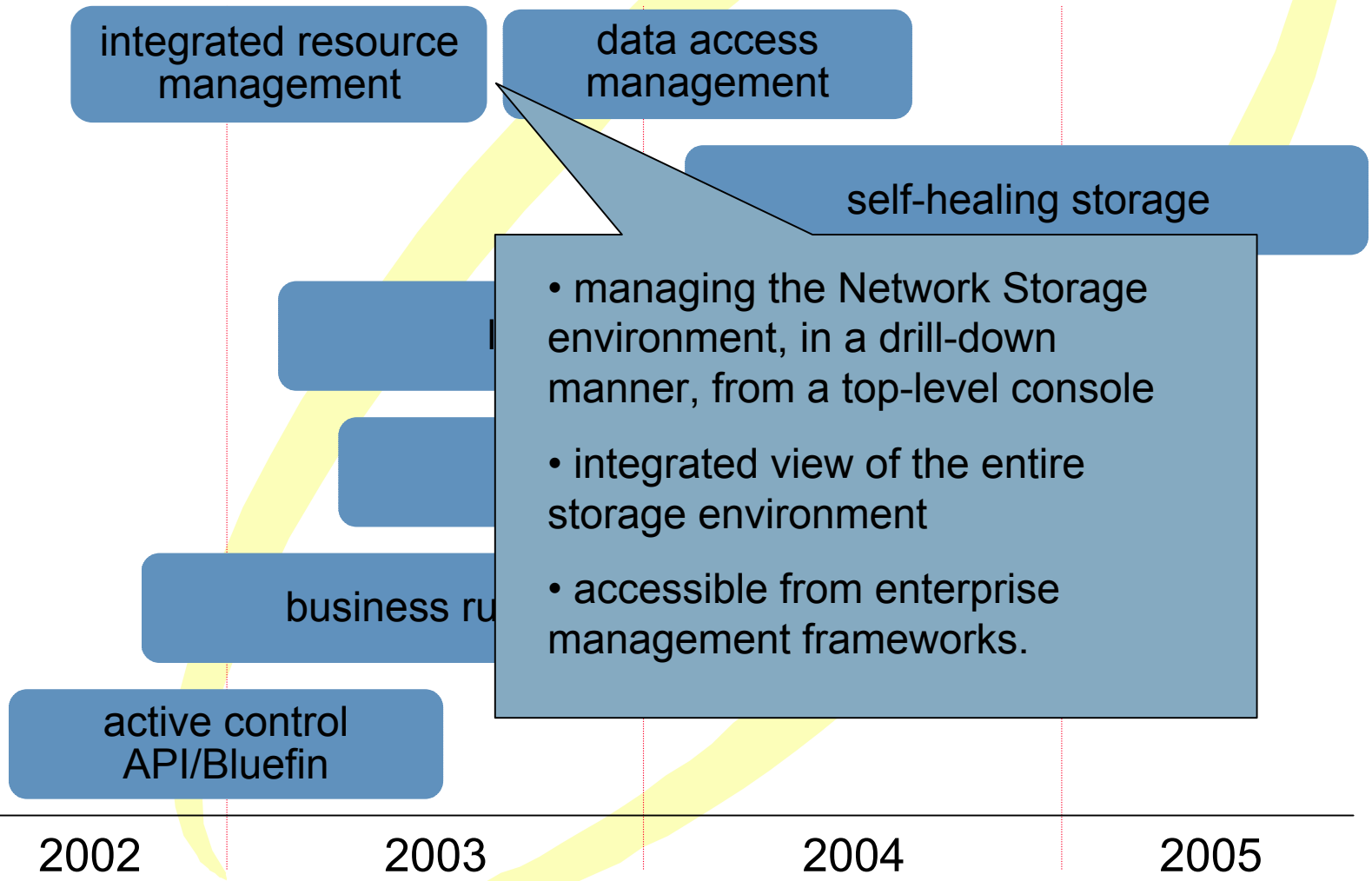
ENSAextended architecture



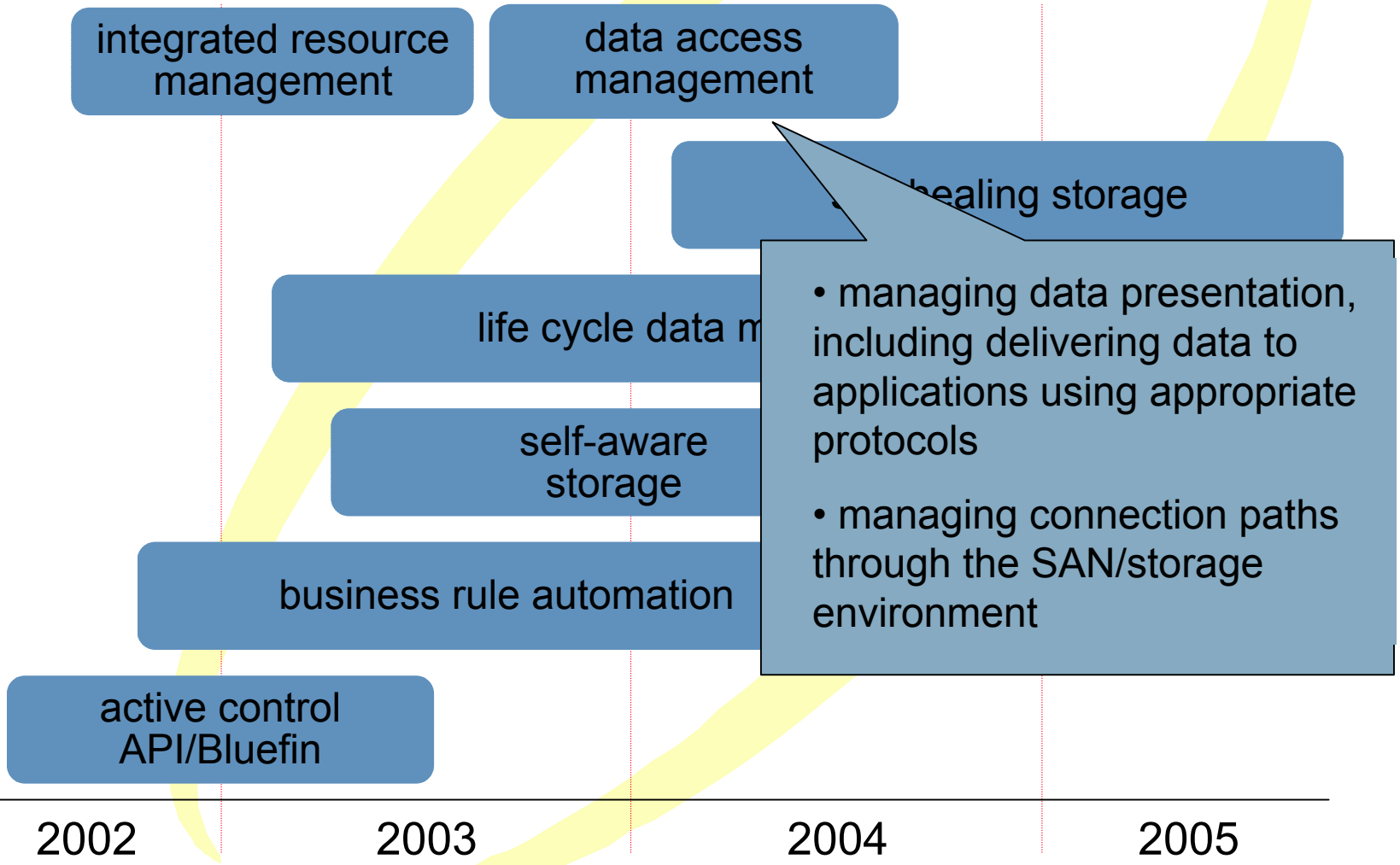
ENSAextended roadmap highlights



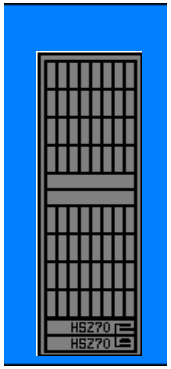
Roadmap highlights

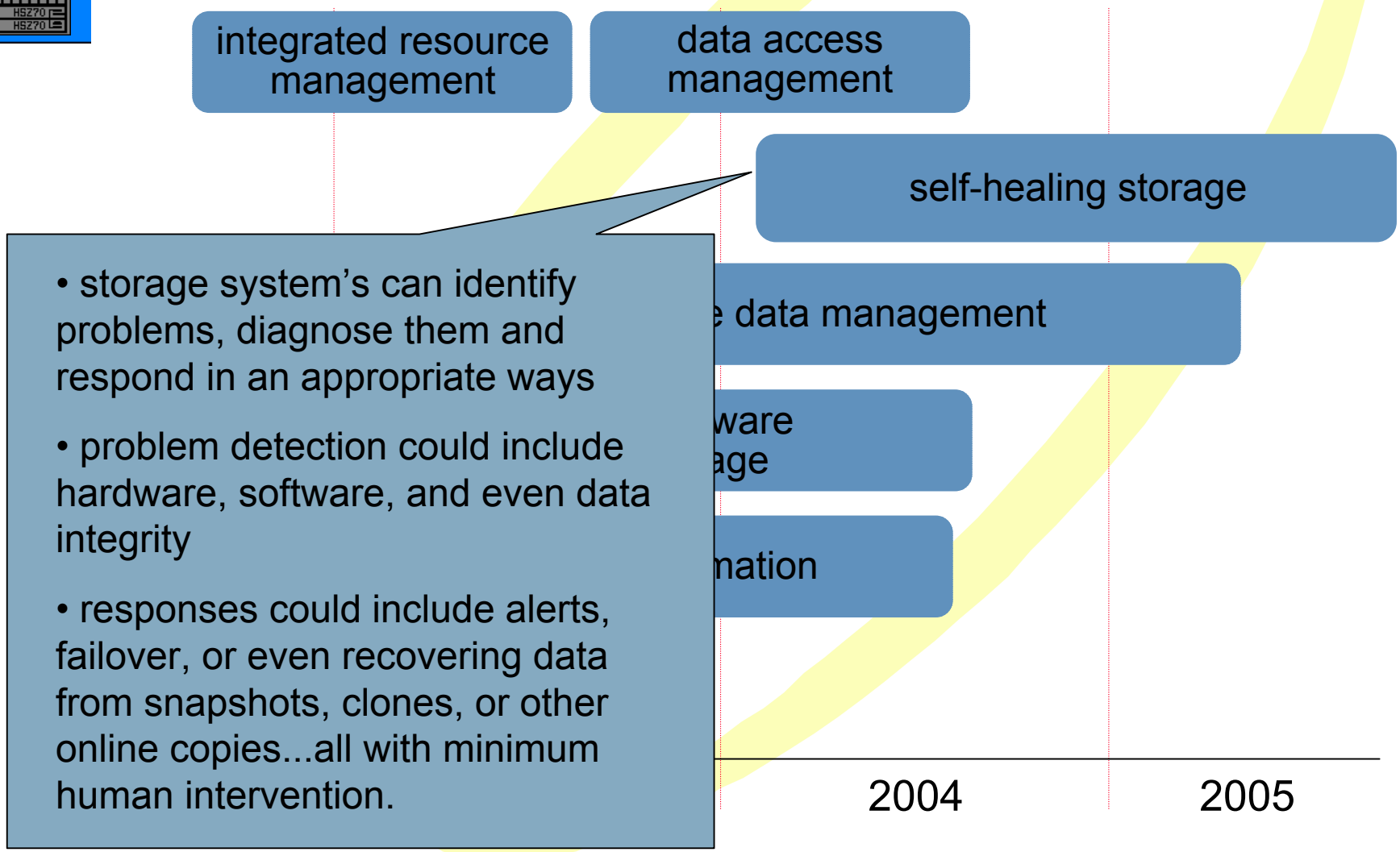


Roadmap highlights



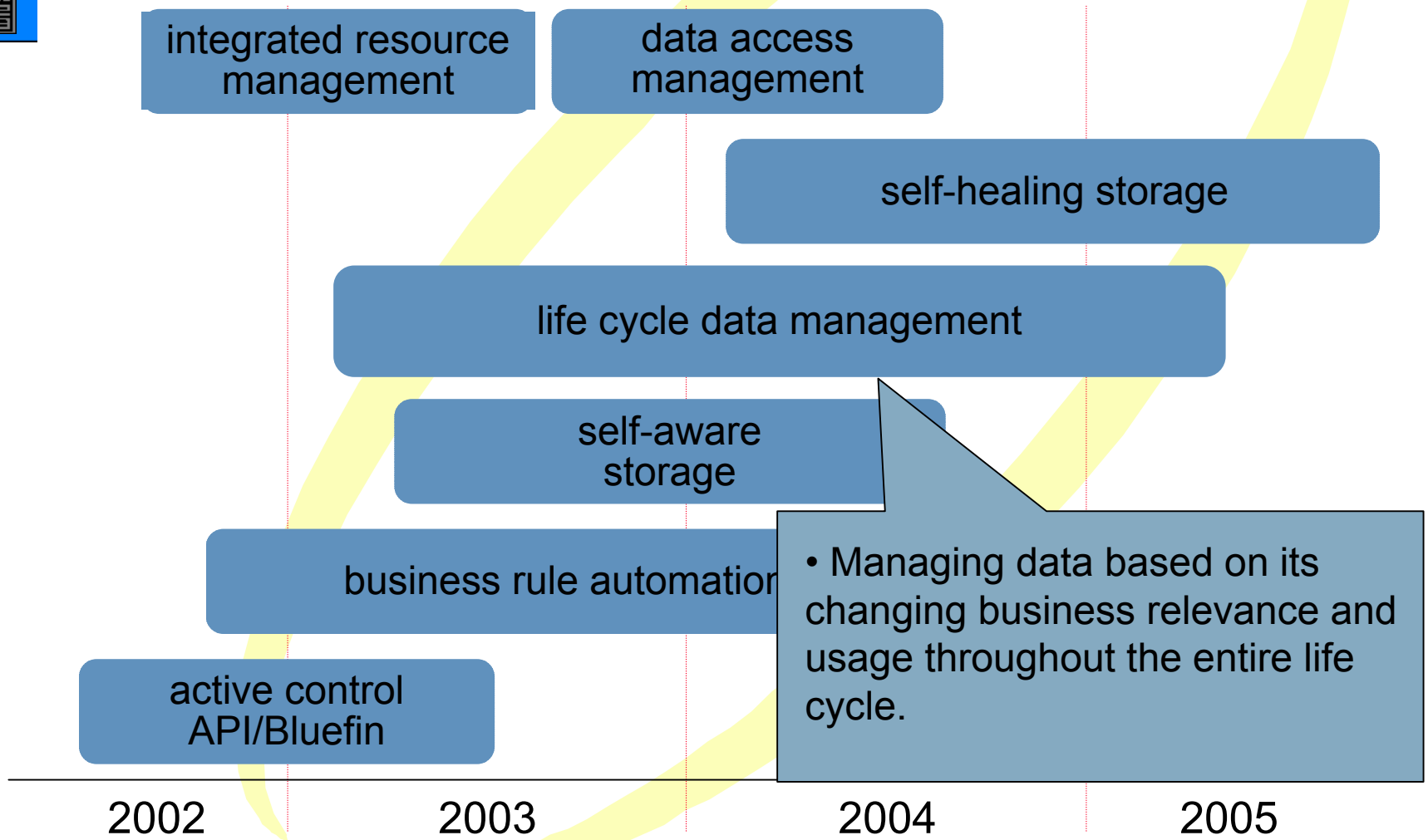
Roadmap highlights





- storage system's can identify problems, diagnose them and respond in an appropriate ways
- problem detection could include hardware, software, and even data integrity
- responses could include alerts, failover, or even recovering data from snapshots, clones, or other online copies...all with minimum human intervention.

Roadmap highlights



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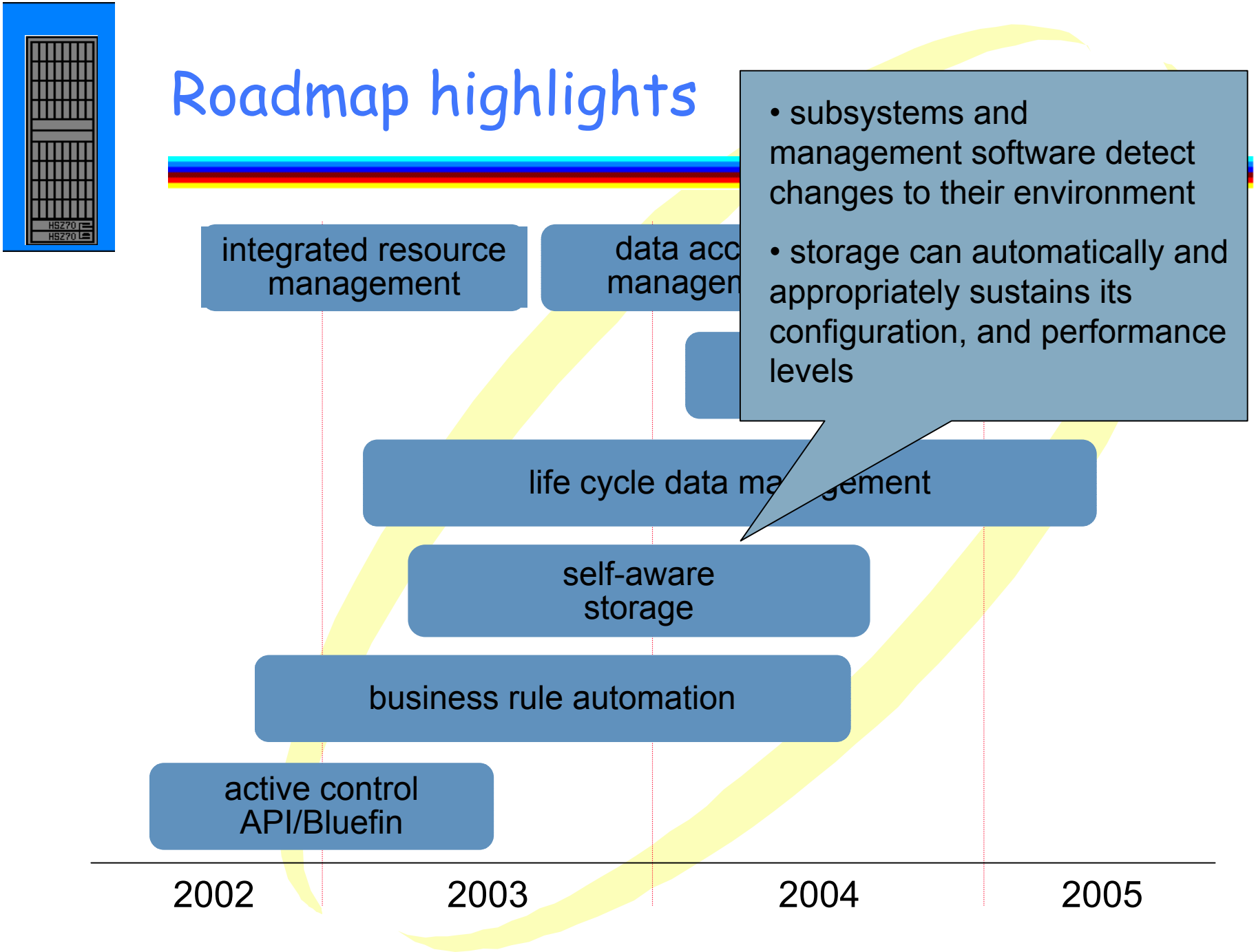

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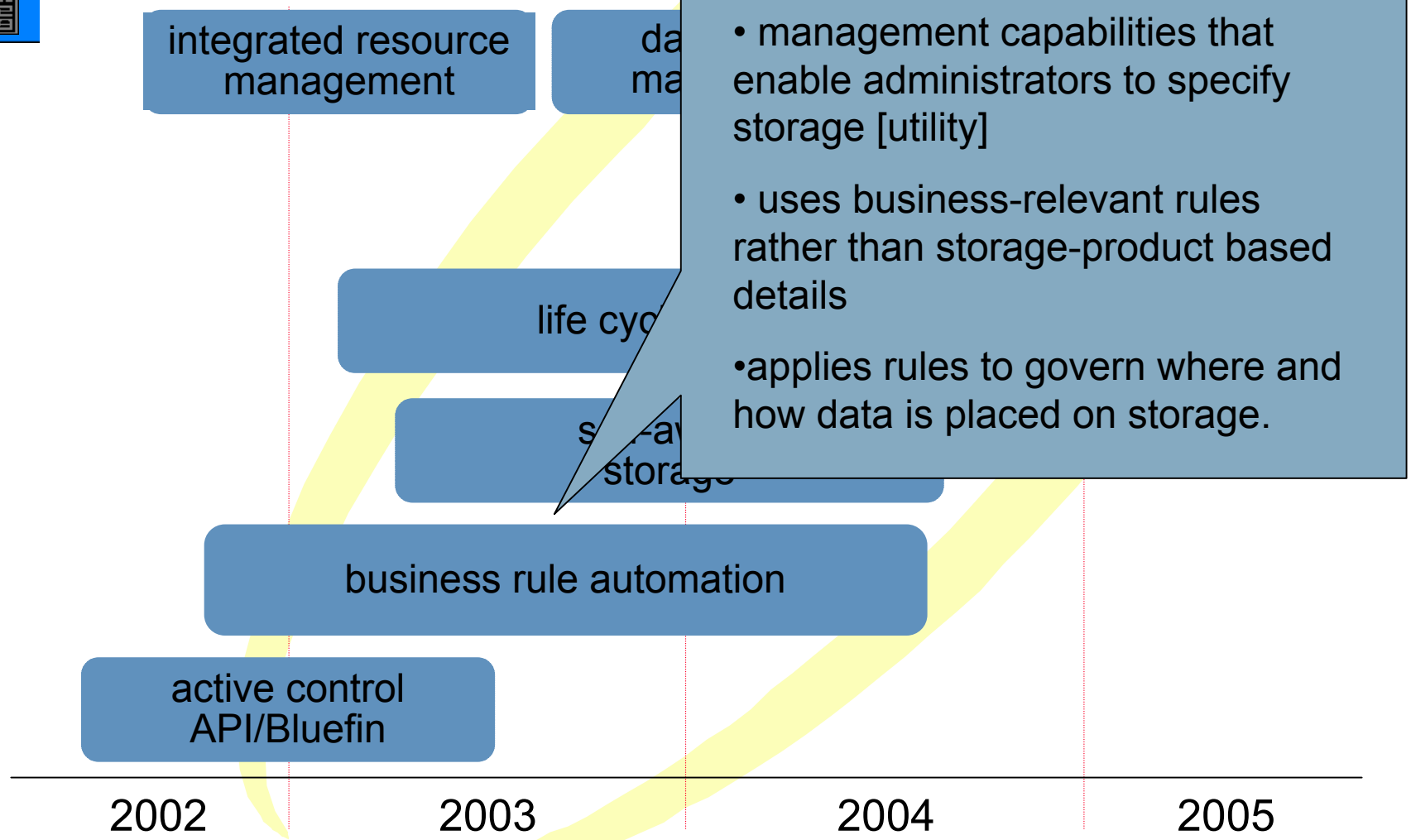

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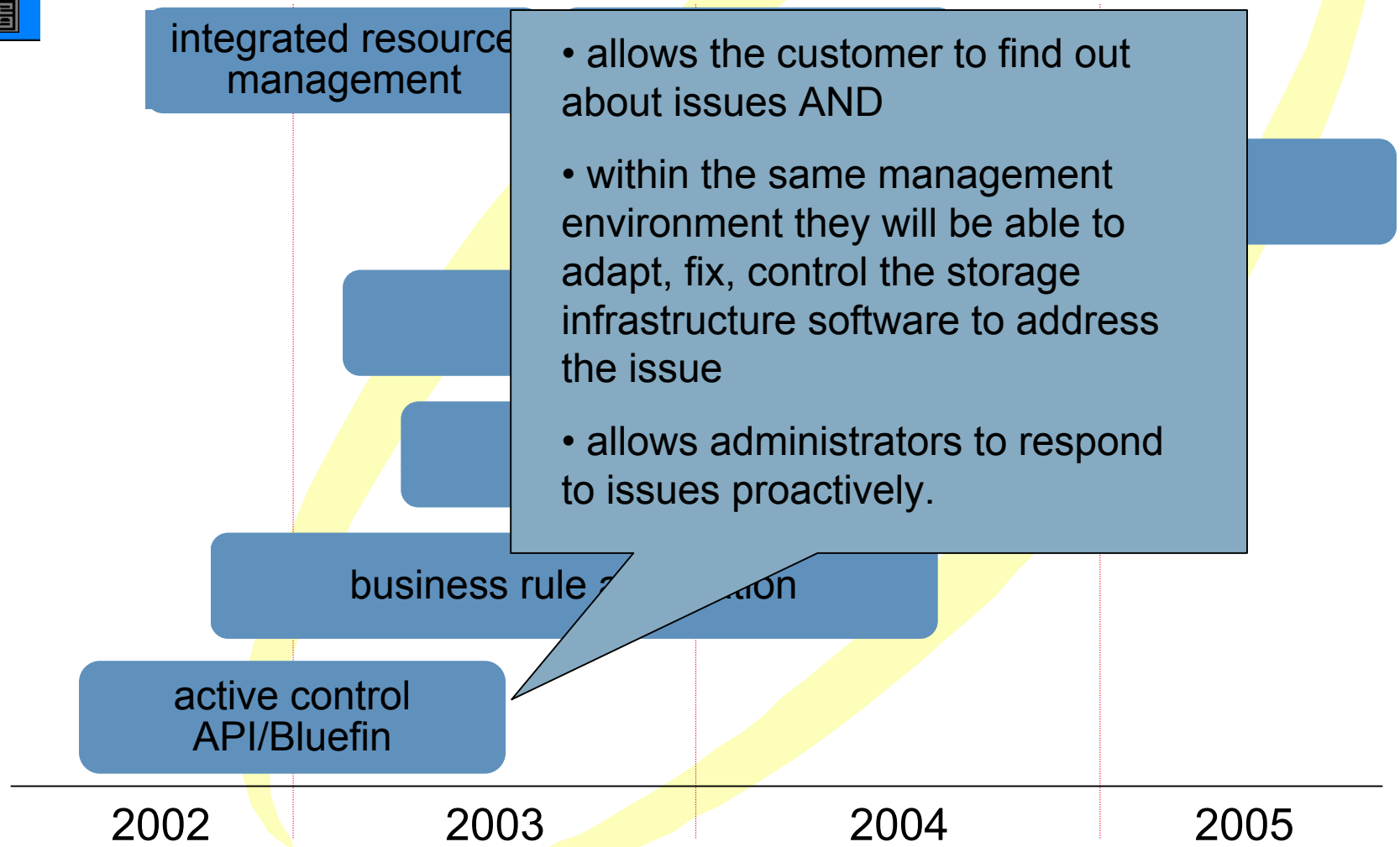

Summary

- ENSAextend supports HP's Adaptive Infrastructure
- ENSAextended is
  - HP's vision for the future of enterprise storage
  - An architecture for a managed storage environment
  - A blueprint for creating a manageable storage utility
- ENSAextended includes a clear, attainable roadmap