



Storage for the Adaptive Enterprise



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Agenda

- Darwin overview
- StorageWorks and Darwin today
- The future: the HP StorageWorks grid

Adaptive Enterprise overview

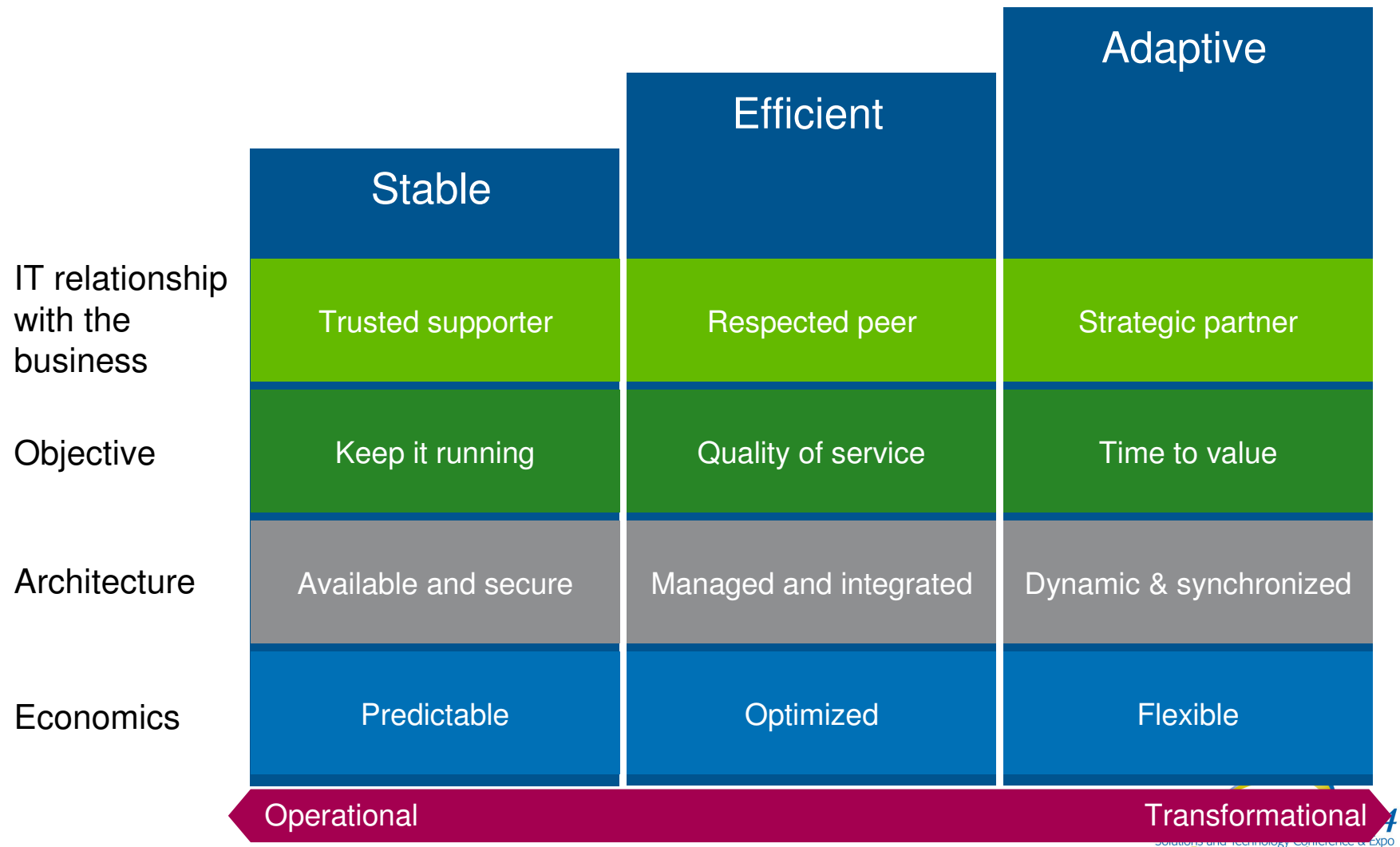


Adaptive Enterprise value proposition



Simplicity	Agility	Value
<ul style="list-style-type: none">• Reduce IT cost and complexity• Reduce business operations costs• Make it easier to implement change• Ensure resources work together	<ul style="list-style-type: none">• Adapt in real time to business needs• Drive change (time, range, ease)• Improve business processes• Accelerate time to market	<ul style="list-style-type: none">• Unlock the value of assets• Free up resources for innovation• Increase revenues and profitability• Create competitive advantage

The three stages of the Adaptive Enterprise journey



Adaptive Enterprise design principles



Measure and assess business agility

Time

The length of time it takes to make a change

+

Range

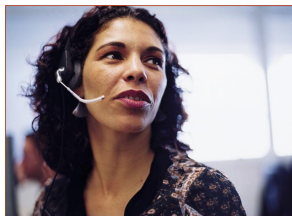
The breadth of change the company is able to handle

+

Ease

The level of effort, cost, and risk required to introduce and support change

Implement through critical people and governance processes



Architect and integrate by applying a consistent set of design principles

Simplification

- Reduce number of elements
- Eliminate customization
- Automate change

+

Standardization

- Use standard technologies and interfaces
- Adopt common architectures
- Implement standard processes

+

Modularity

- Break down monolithic structures
- Create reusable components
- Implement logical architectures

+

Integration

- Link business and IT
- Connect applications and business processes within and outside the enterprise



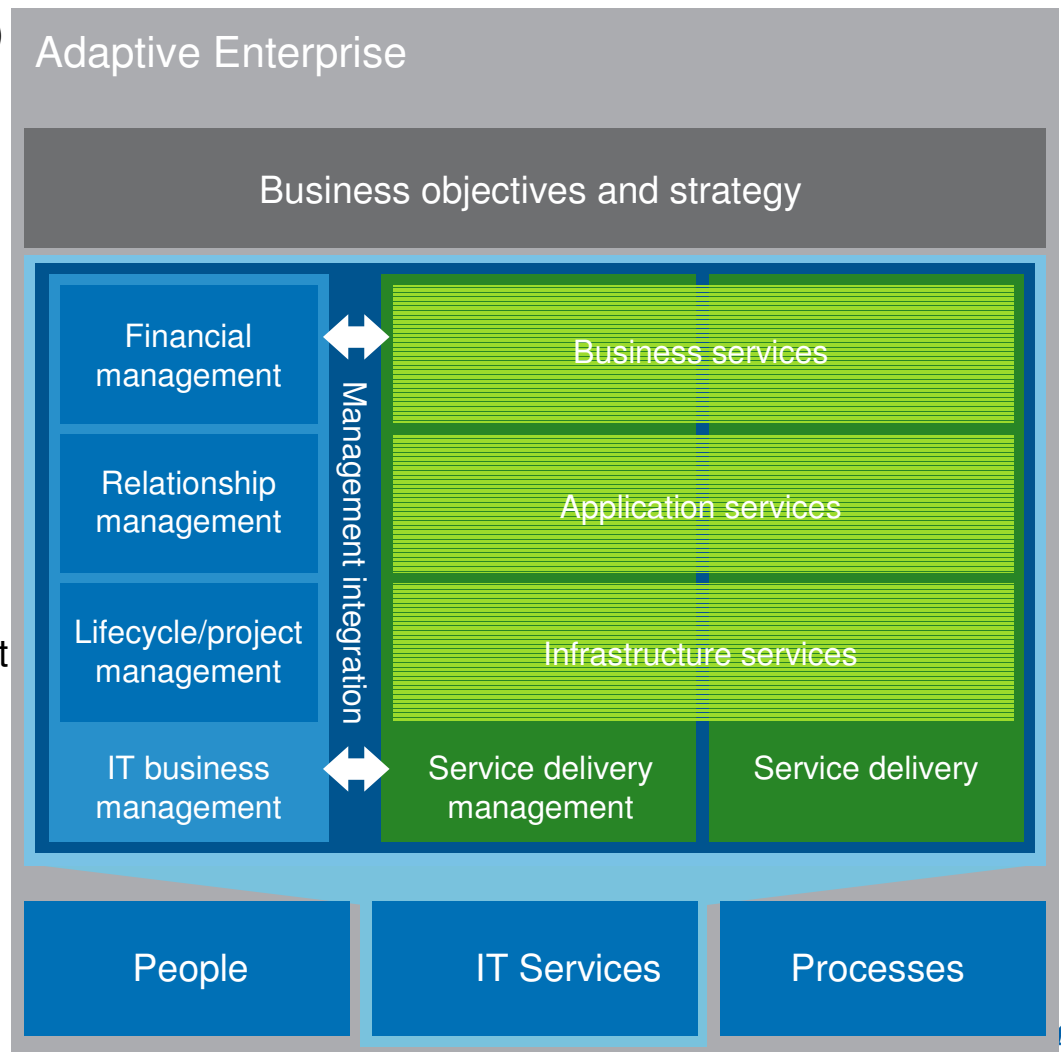
Design rules for the Darwin Architecture deliver...



- Service-oriented architecture (SOA) and virtualization deliver IT flexibility and choice
 - Protects legacy investments
 - Allows heterogeneity, doesn't force homogeneity and monolithic rules
 - Leverages industry investment
 - Enables parallel innovation, fast response to change
 - Provides multi-sourcing, flexibility of outsourcing/in-sourcing
- Model driven automation simplifies execution of IT practices
 - Cost of change is low and predictable
 - Automates service lifecycle delivery and management

Darwin: Adaptive Enterprise blueprint

- Service-oriented architecture (SOA) and virtualization
 - Service is the unit of modularity
 - Layer services types: infrastructure, application and business
 - Separate service perspectives: functional from management
- Model-driven automation (MDA)
 - Service defined by model
 - Models encapsulated within layers
 - Models express dependencies between layers
 - Models provide continuity throughout the service lifecycle
- SOA, virtualization, and MDA combine to realize the Adaptive Enterprise

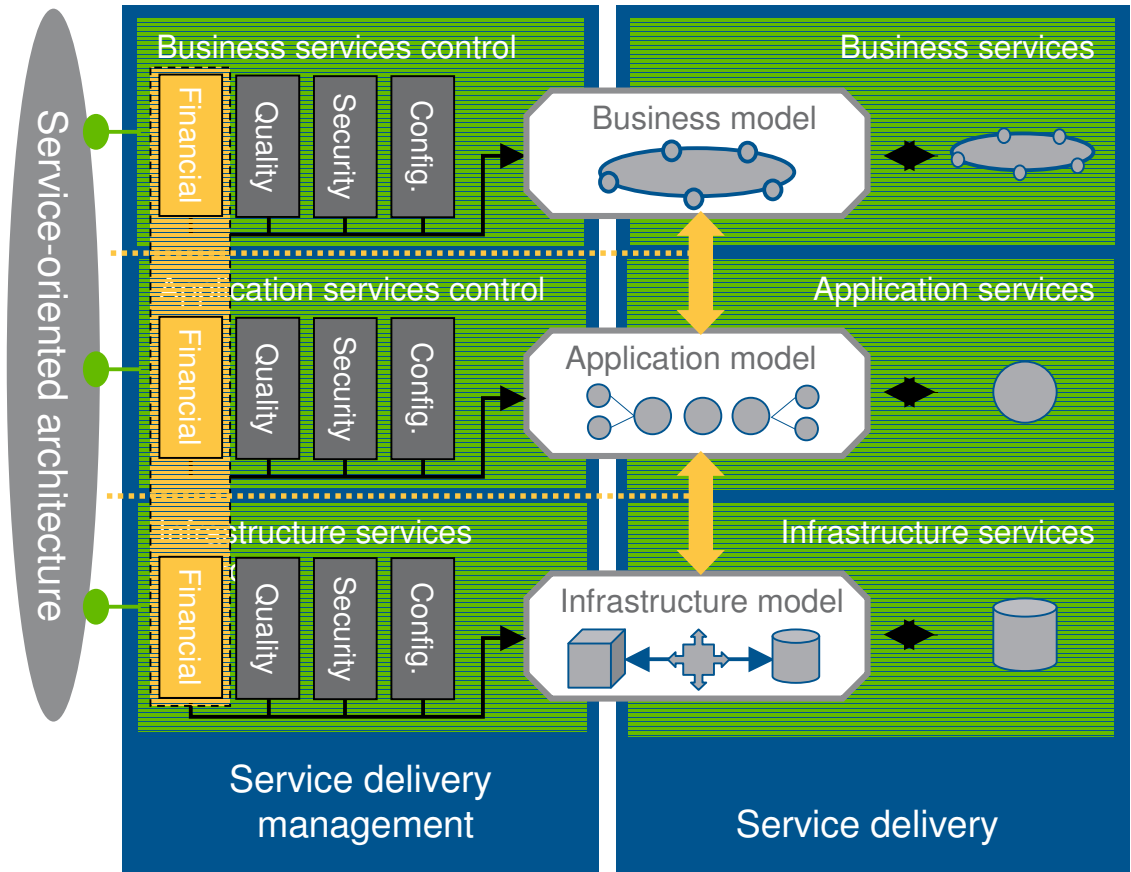



Integration: service-oriented architecture (SOA)



SOA service management
integration

Services perspectives can
be managed across layers



 Integrated financial perspective

Management

Functional
HP WORLD 2004
Solutions and Technology Conference & Expo

StorageWorks and the Adaptive Enterprise today



How HP StorageWorks delivers the HP value proposition



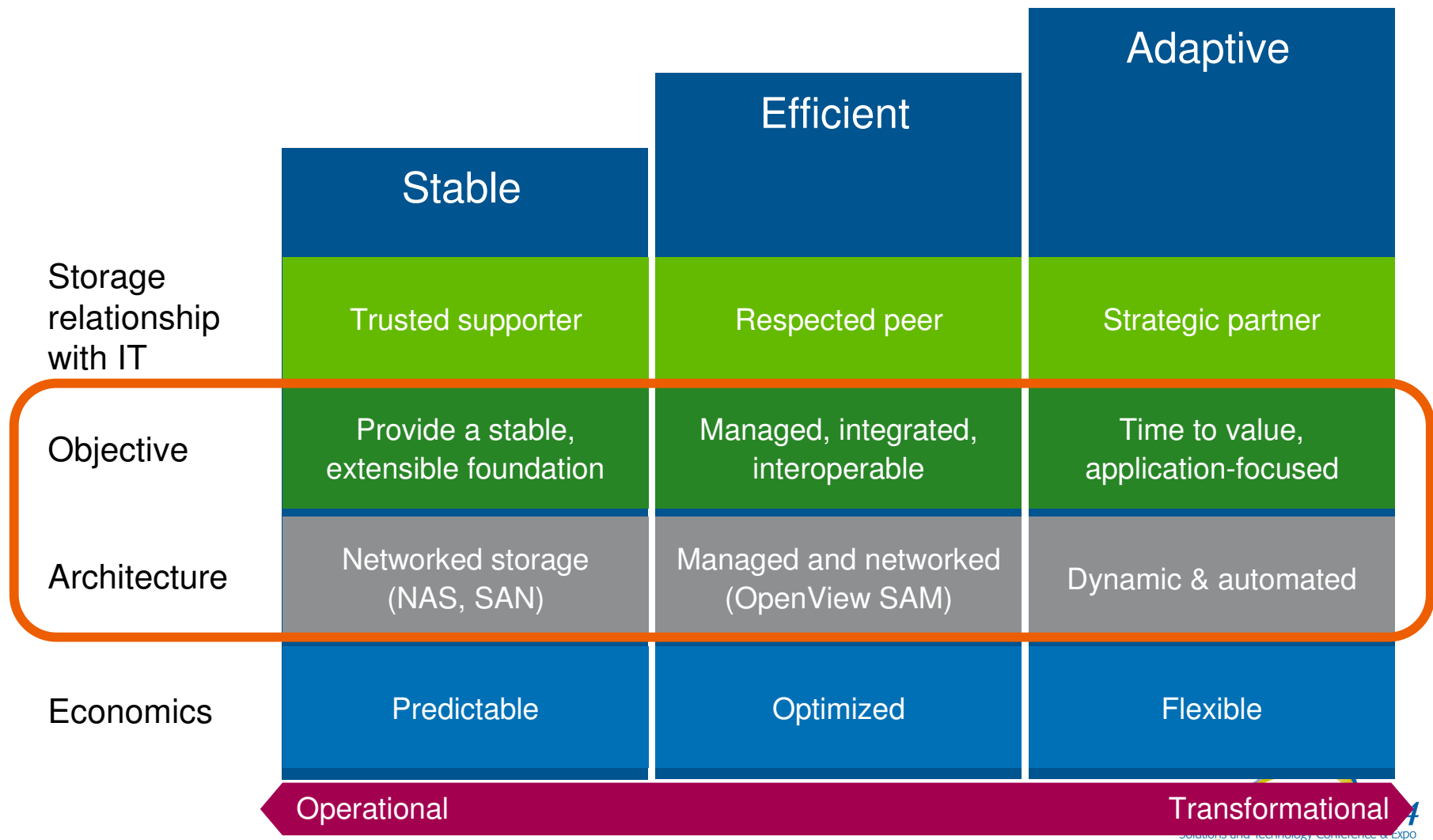
Agility
Performance
Scalability

Value
Cost Reduction
Investment Protection

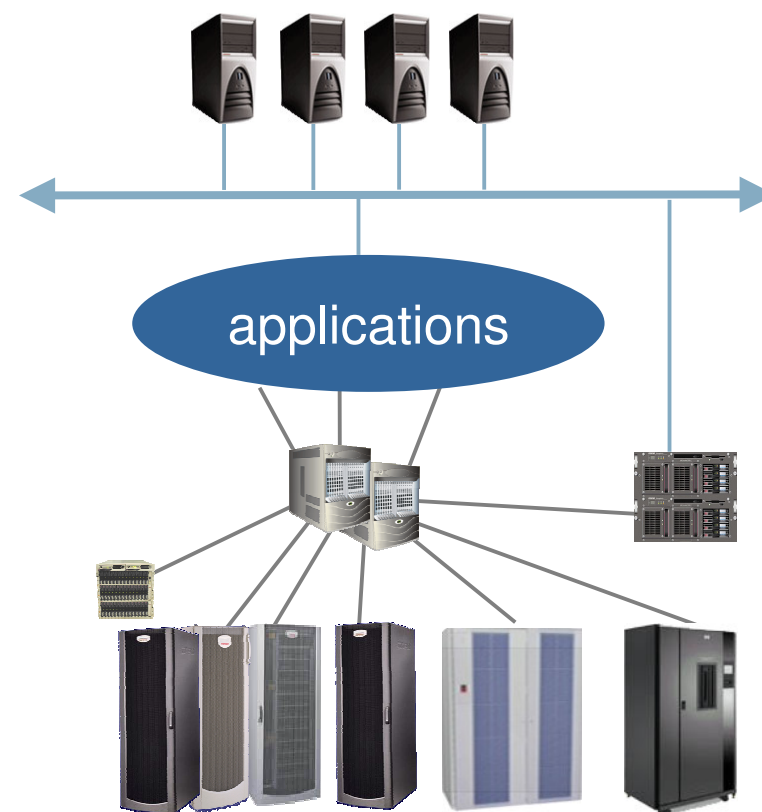


Simplicity
Remove tasks

The StorageWorks journey for the Adaptive Enterprise



Stable: networked storage



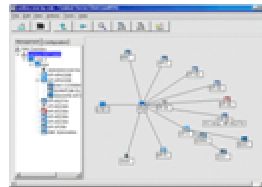
NAS/SAN convergence

Efficient: centralized management



Stability-focused

device discovery,
configuration
SAN visualization



device and usage
monitoring and
administration



HP OpenView

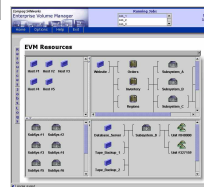


Efficiency-focused

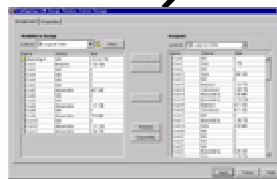
virtualization



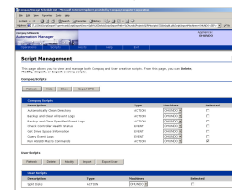
performance management
data management
(snapshots, global replication)



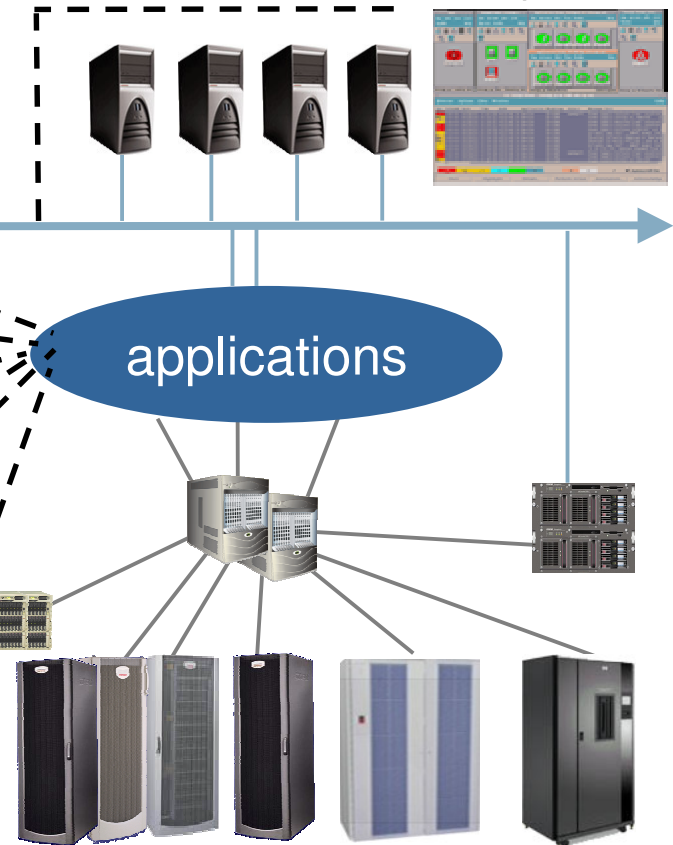
storage provisioning



Adaptive-focused



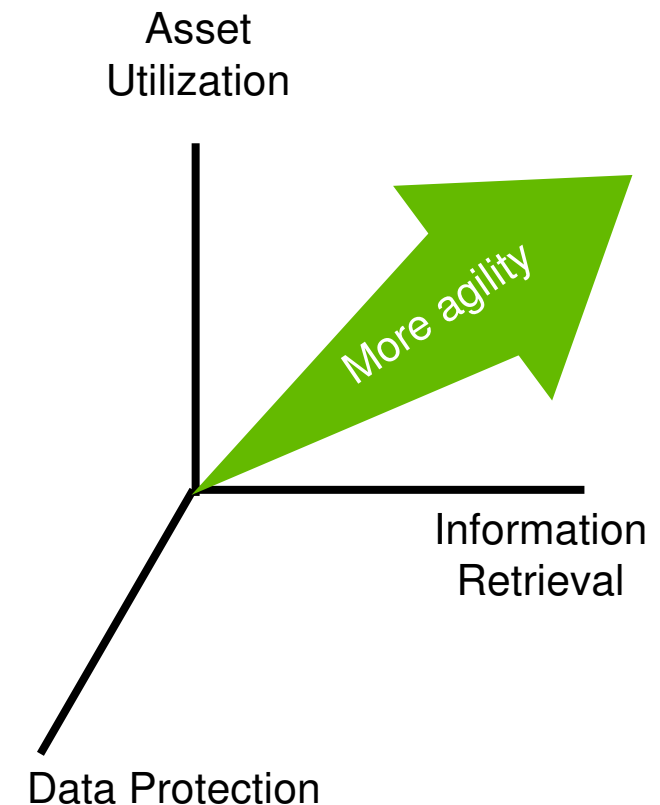
policy based automation



Adaptive: Application-focused management



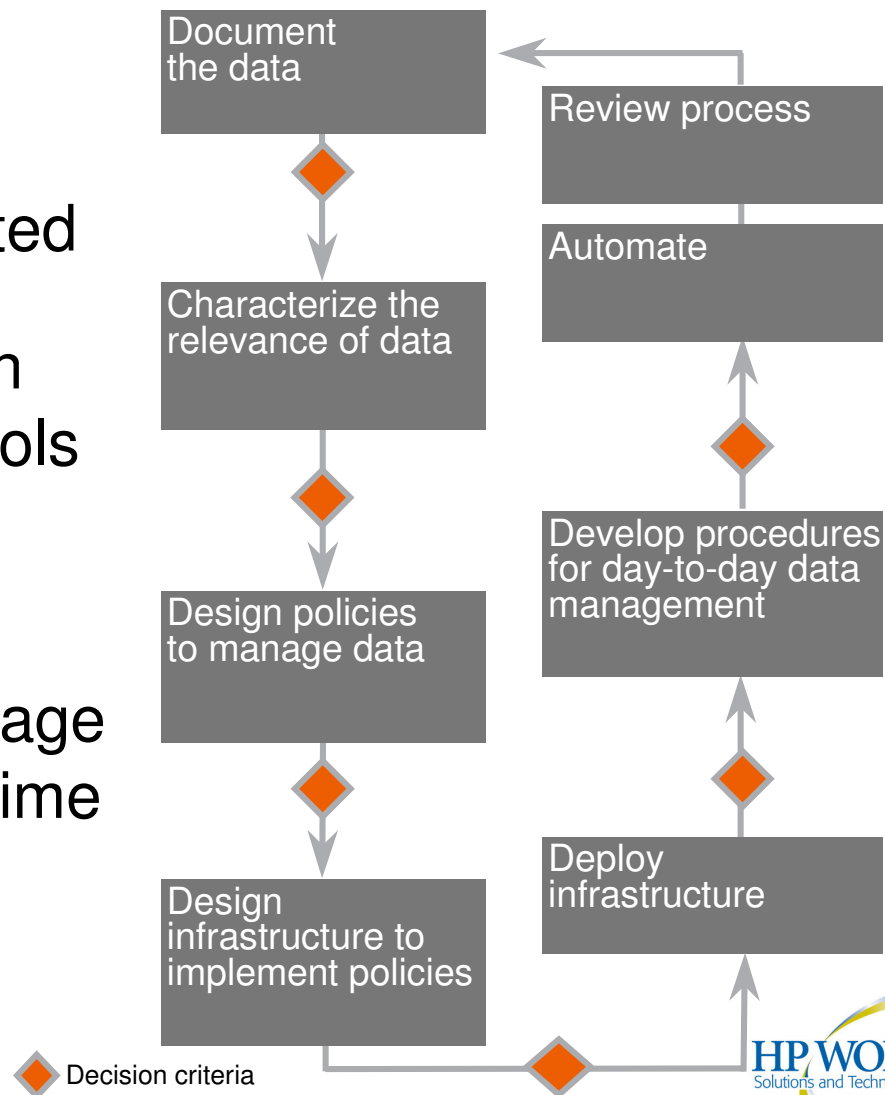
- Information Lifecycle Management
 - Service Oriented Architecture for storage
- Automates information management through its life cycle
 - Based on its relevance, usage and QoS objectives
- Results
 - More efficient storage asset utilization
 - Data placement, migration
 - More consistent data management
 - Policy-driven, automatic implementation
 - Application-focused information delivery
 - QoS implementation —> automatic SLA delivery
 - Faster information access, retrieval
 - Highly scalable content index/search
 - Improved security and compliance



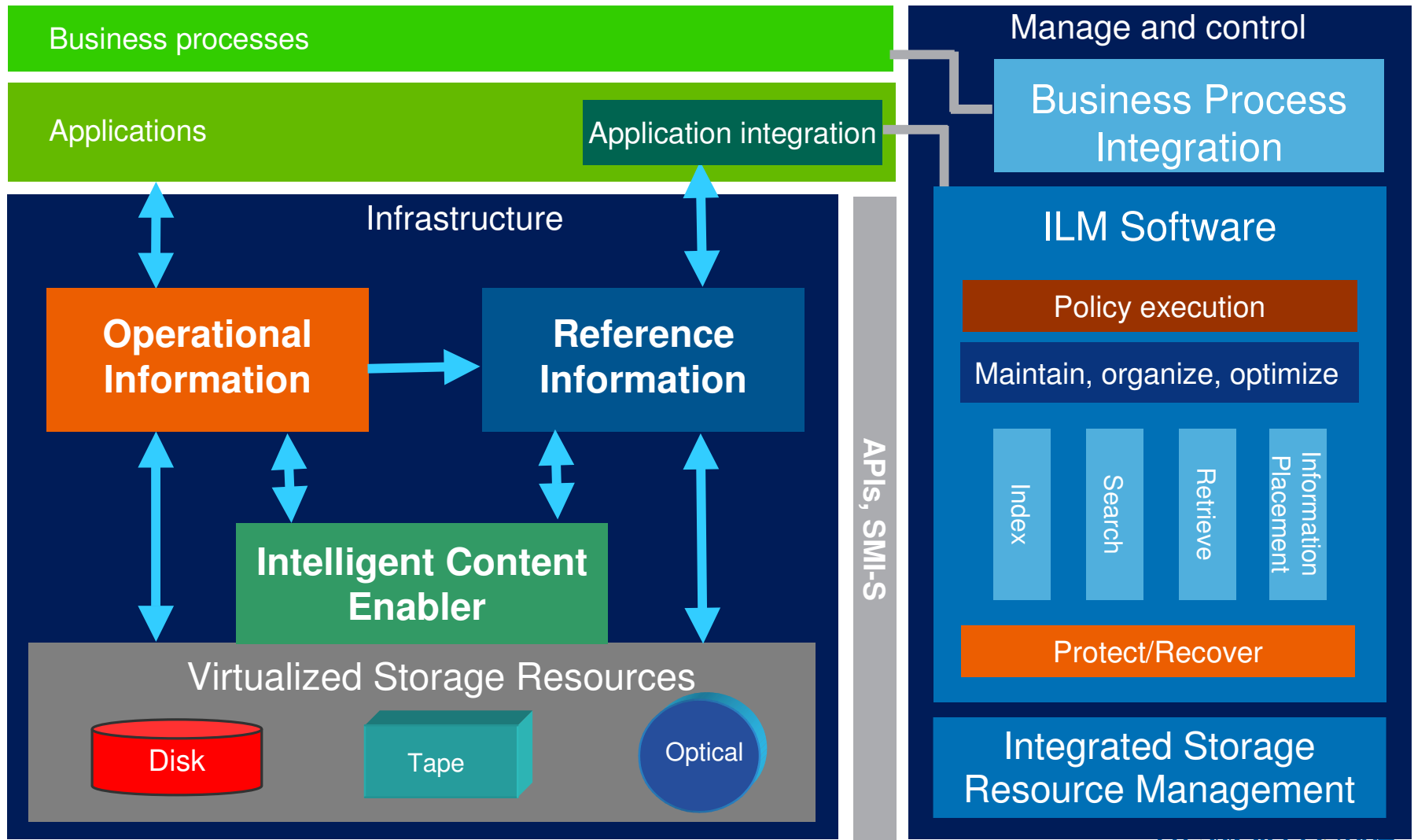
ILM business discipline and related processes



- Effective workflow requires:
 - Defined and automated processes
 - Investment protection
 - Work with existing tools and structures
 - Interoperability
 - Work with/across applications and storage
 - Ability to scale over time and with technology
 - Bullet-proof retrieval

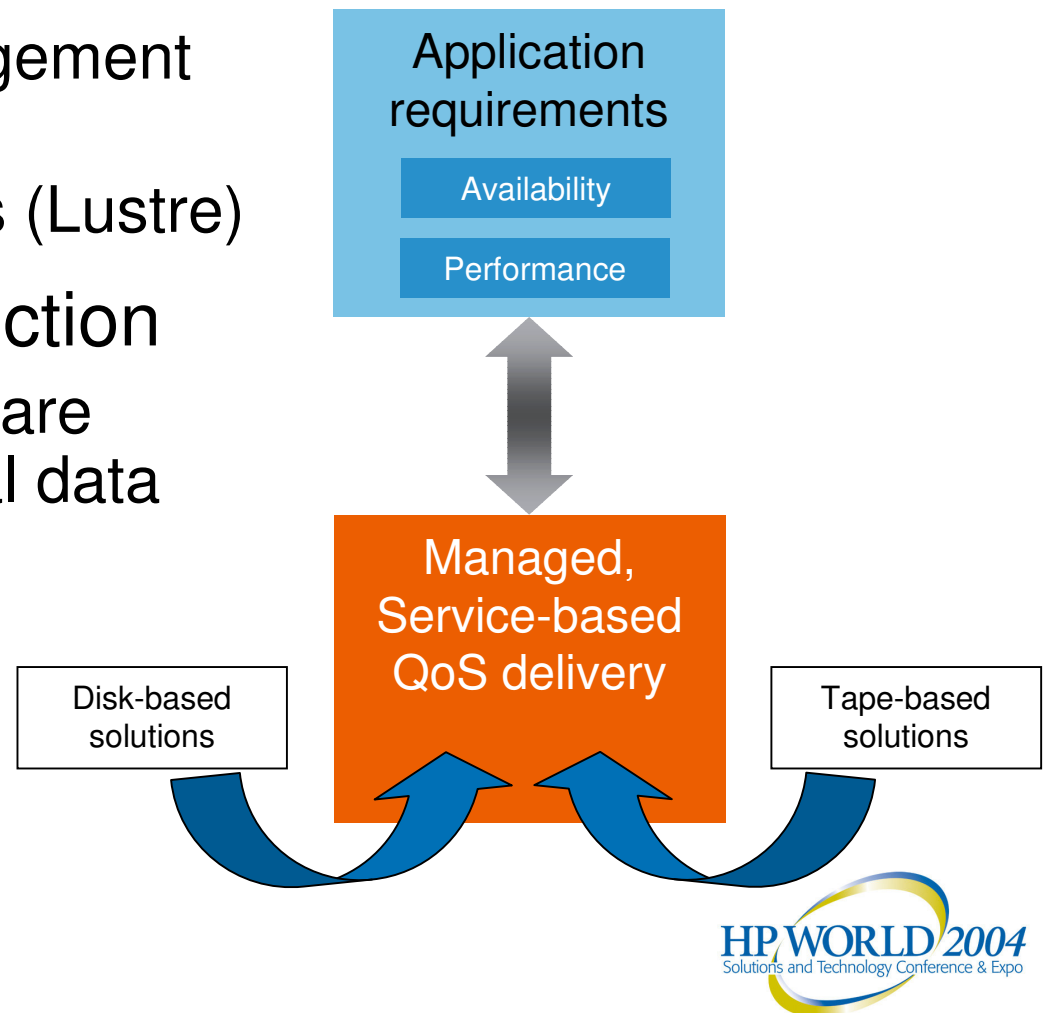


ILM reference architecture



ILM unifies many technologies

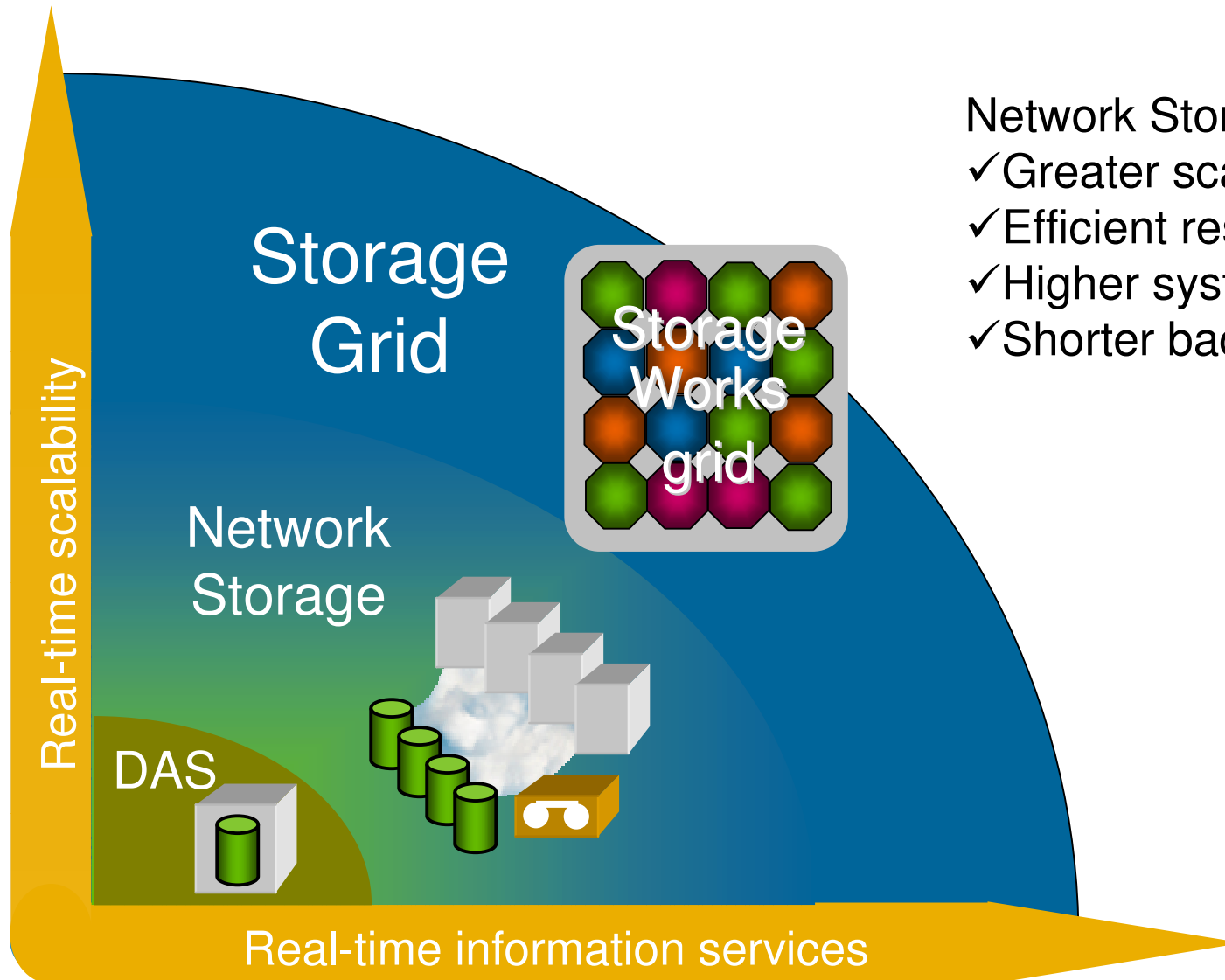
- Management simplification
 - Server/storage management integration
 - Clustered file systems (Lustre)
- Multi-level data protection
 - Backup and recovery are merging into a general data protection class
- Standards
 - BPEL, SOAP, XML, SMTP
 - SMI-S, iSCSI



Storage for the future: the HP StorageWorks grid



A revolutionary thought on an evolutionary path



- Network Storage Enabled
- ✓ Greater scalability
 - ✓ Efficient resource sharing
 - ✓ Higher system availability
 - ✓ Shorter backup windows

Our storage vision

- Delivering the storage needs for the adaptive enterprise
 - A single, unified, managed storage ecosystem
 - Viewed as a single system by applications and administrators
- Scalable in many dimensions
- Self-aware, self-healing, self-managing, self-optimizing
- Storage management is decoupled from external resources
- High degree of application awareness

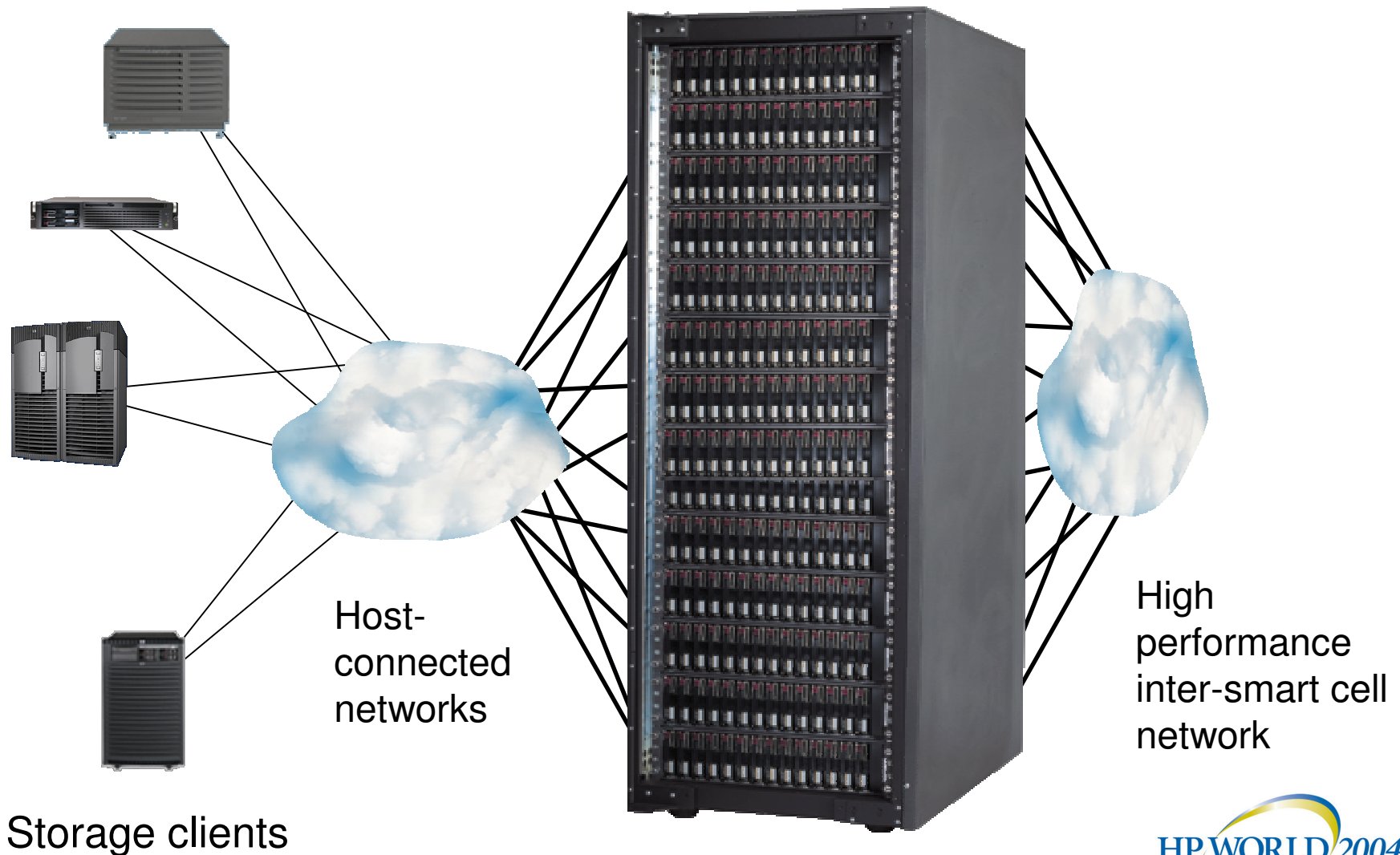


A more mature storage utility

- An **ecosystem** designed from the ground up to be self-managing
 - Management is integral
 - The system **self optimizes**
 - Determines bottlenecks
 - Adopts and provides information for growing the system as the business requires
 - Automatically detects added components, reconfigures to use them
 - The system automatically detects failures, reconfigures to use hot spares



HP StorageWorks grid: A unique “virtualized array”



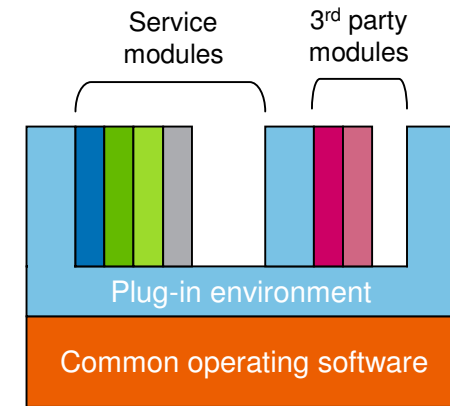
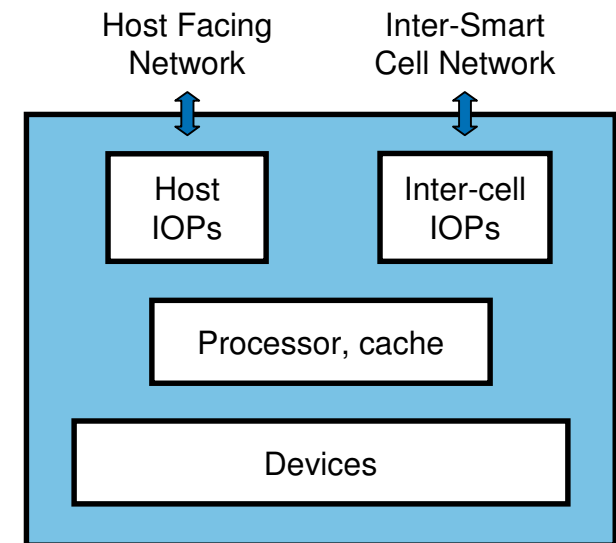
Storage clients

HP StorageWorks grid advances

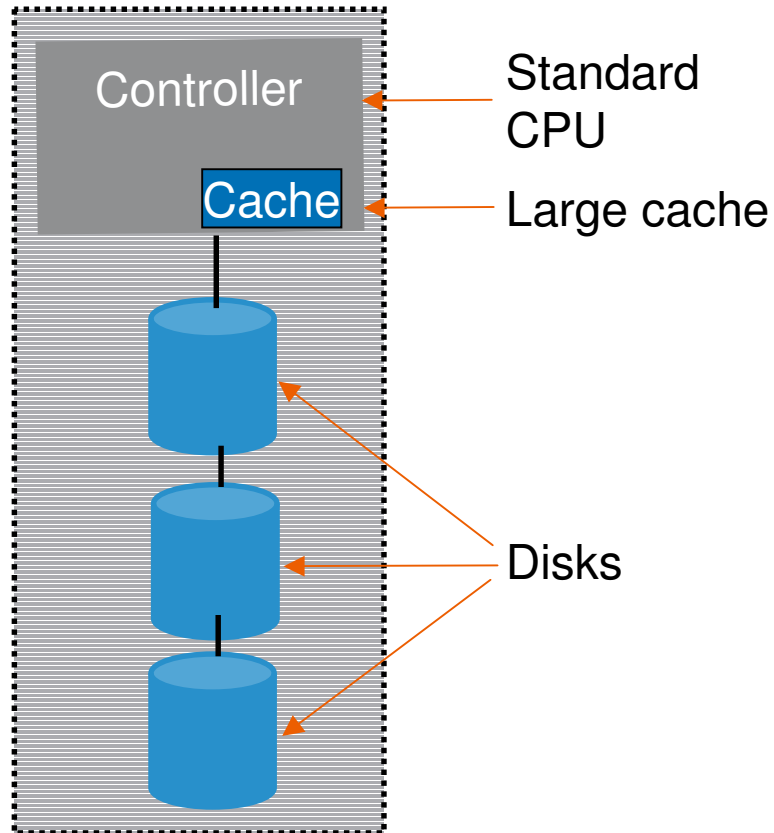
- Manageability
 - Single system image
 - Largely self-configuring
- Cost
 - Based on commodity components
- Scalability
 - Easier than today: capacity + performance + availability
 - Management remains simple
- Changeability
 - Change smart cell functionality via downloadable software “personality”

HP StorageWorks grid composition

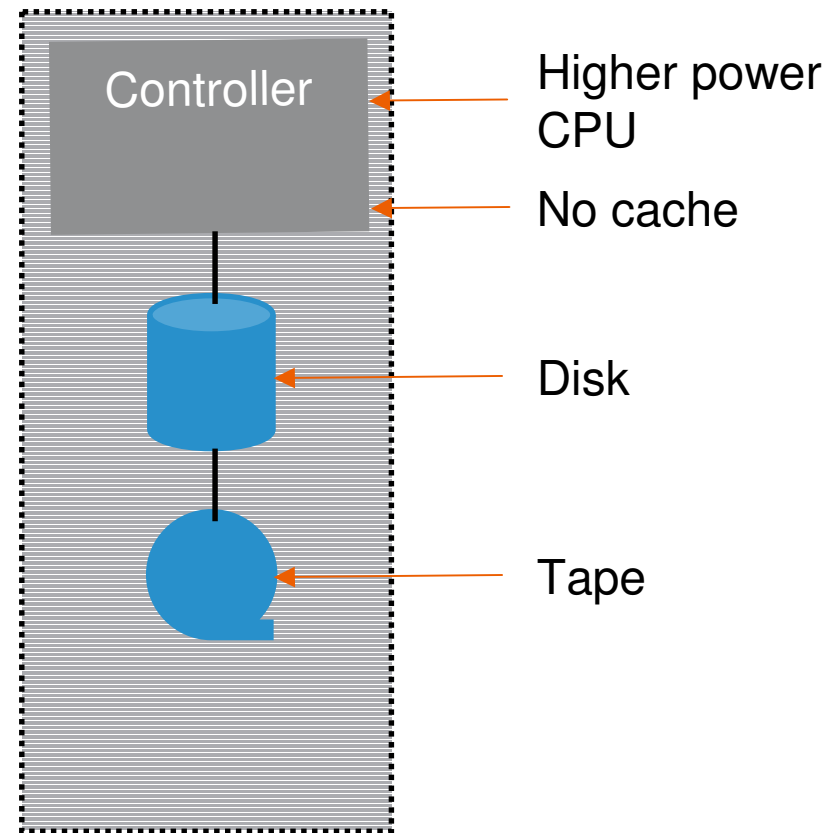
- Smart cell hardware
 - Processor
 - Cache
 - Internal disks, tapes, etc.
 - Off-the-shelf components
- Smart cell software
 - Federates with peers
 - Places data on internal devices
 - Provides smart cell “personality”
 - Responds to changes
 - Redistributes data and workloads
 - Hosting environment for 3rd party software
- Smart cells are federated into domains



Smart cells—many kinds



High performance,
available smart cell



Data protection
smart cell

HP StorageWorks grid services

External System Communications

- Data import / export
- Event / config import /export

- Services for information transfer across systems

Content Services

- Search
- Schema Validation
- Notification
- Neutralize/normalize
- Document shredding
- Repository Virtualization

- Services for processing and presenting information

Extended Data Services

- Data transformation
- Data classification
- Virus Checking
- Media Migration Mgmt
- Grid Sharing
- Immutability
- Repository Virtualization

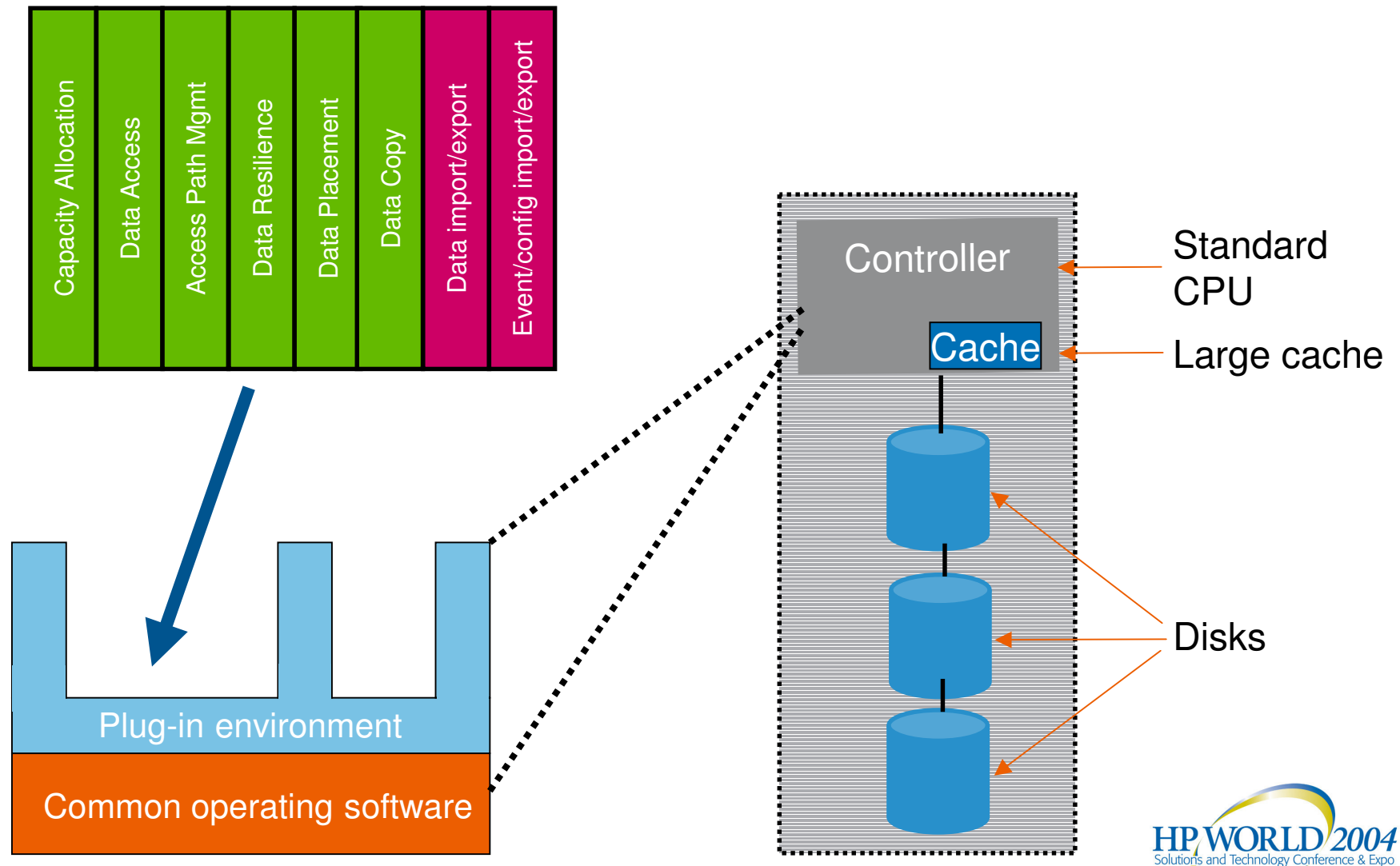
- Services to manipulate data, create information, and provide advanced protection capabilities

Data Services

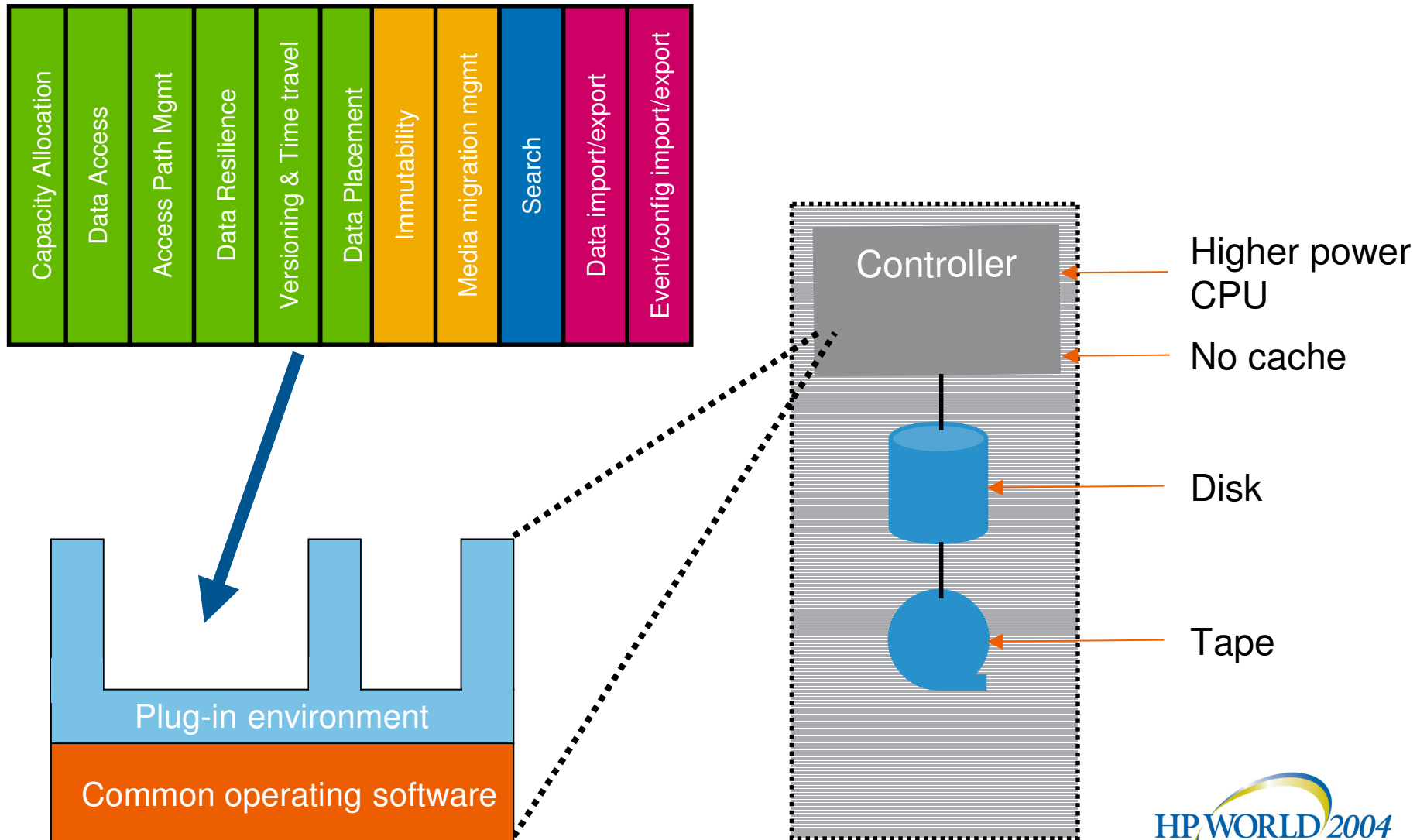
- Capacity Allocation
- Data Access
- Access Path Mgmt
- Data Resilience
- Versioning and Time Travel
- Data Placement
- Locking and Transactions
- Data Copy

- Traditional storage services to protect data and manage the storage infrastructure

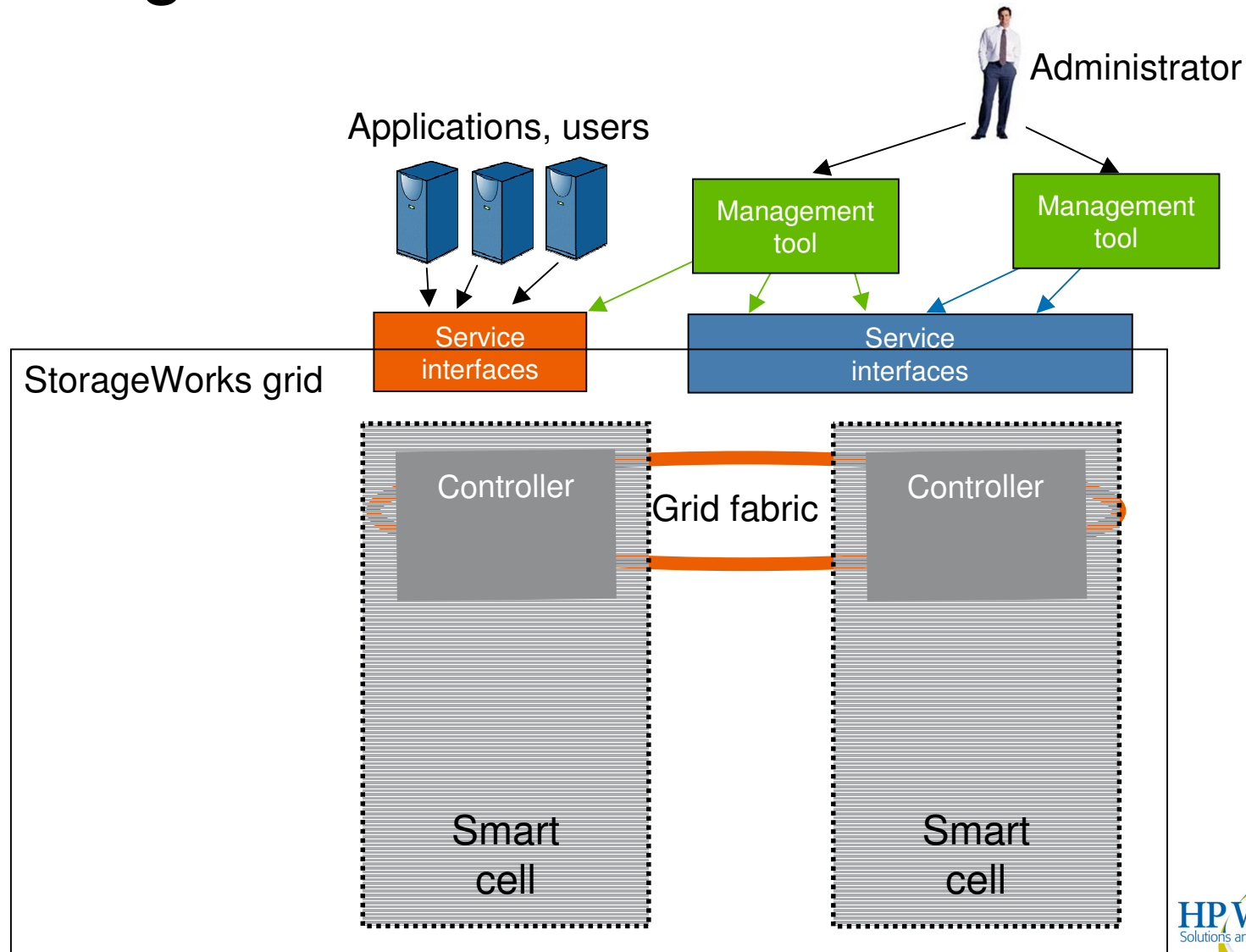
High performance smart cell



Archive smart cell

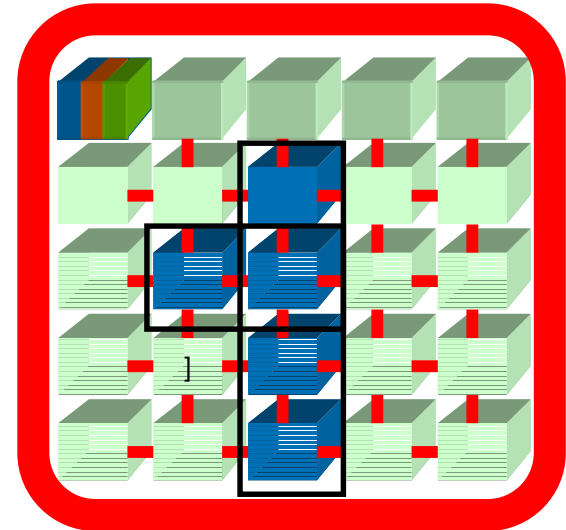


Storage network services interfaces

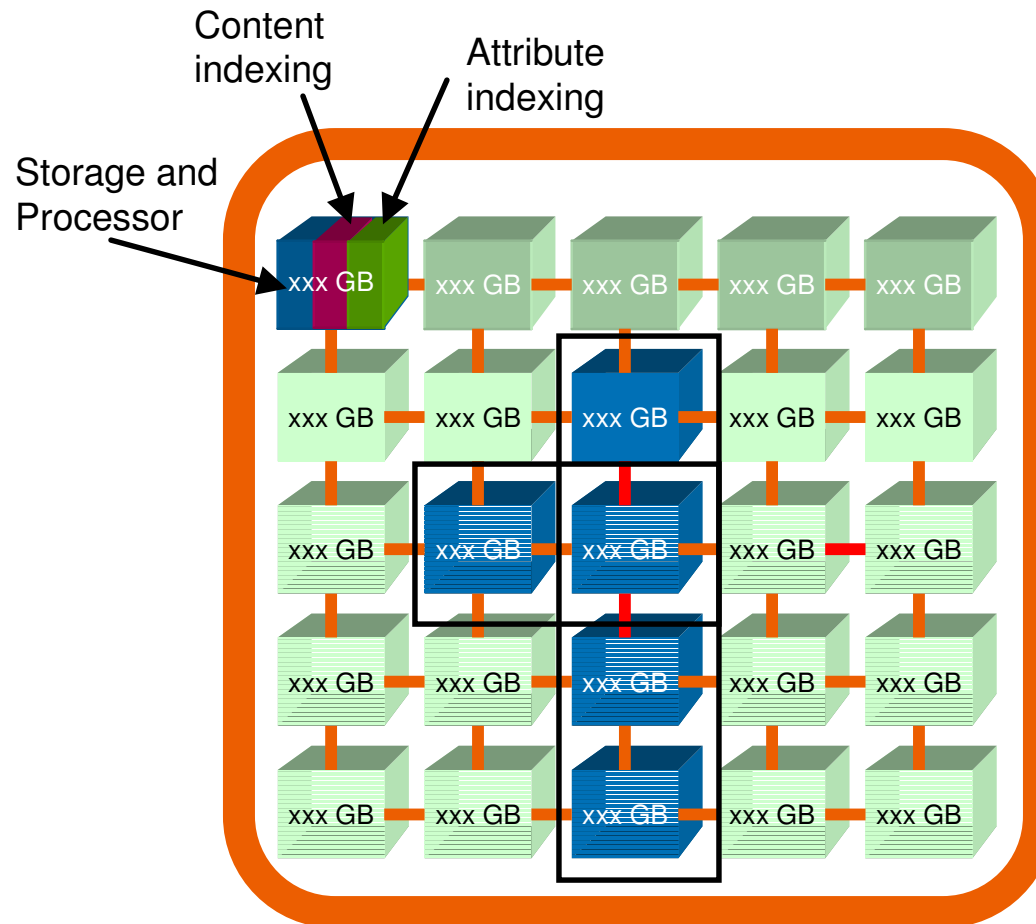


HP StorageWorks grid ancestors

- EVA
 - Virtualization, simplified management
- RISS
 - Smart cells
 - Federated architecture
 - Single system image
 - Distributed services
- StorageWorks Scalable File Share
 - Single system image
 - Highly scale file serving
 - Commodity modules
- Federated Array of Bricks (HP Labs' FAB)
 - Modular, federated architecture
 - Single system image
 - Commodity modules



RISS: example of a HP StorageWorks grid

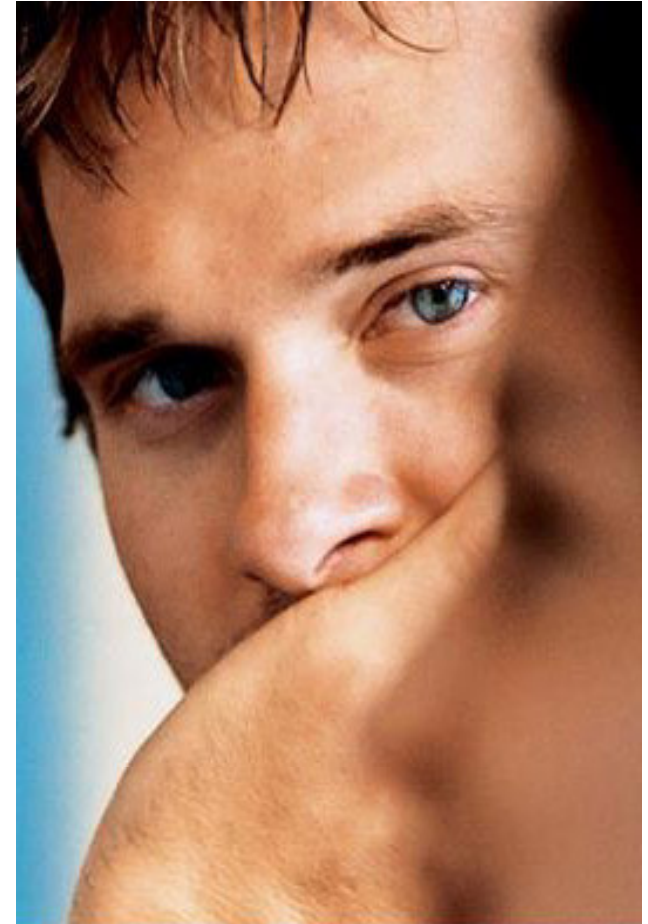


A photograph of a forest scene. In the foreground, a dark asphalt path curves from the bottom left towards the right. To the left of the path, there is a dense row of tall, conical evergreen trees with a bluish-green tint. Behind these evergreens and to the right of the path, there is a lush green lawn. The background is filled with a dense forest of various green trees, including some taller, thinner trees with reddish-brown trunks. The sky is a pale, overcast white.

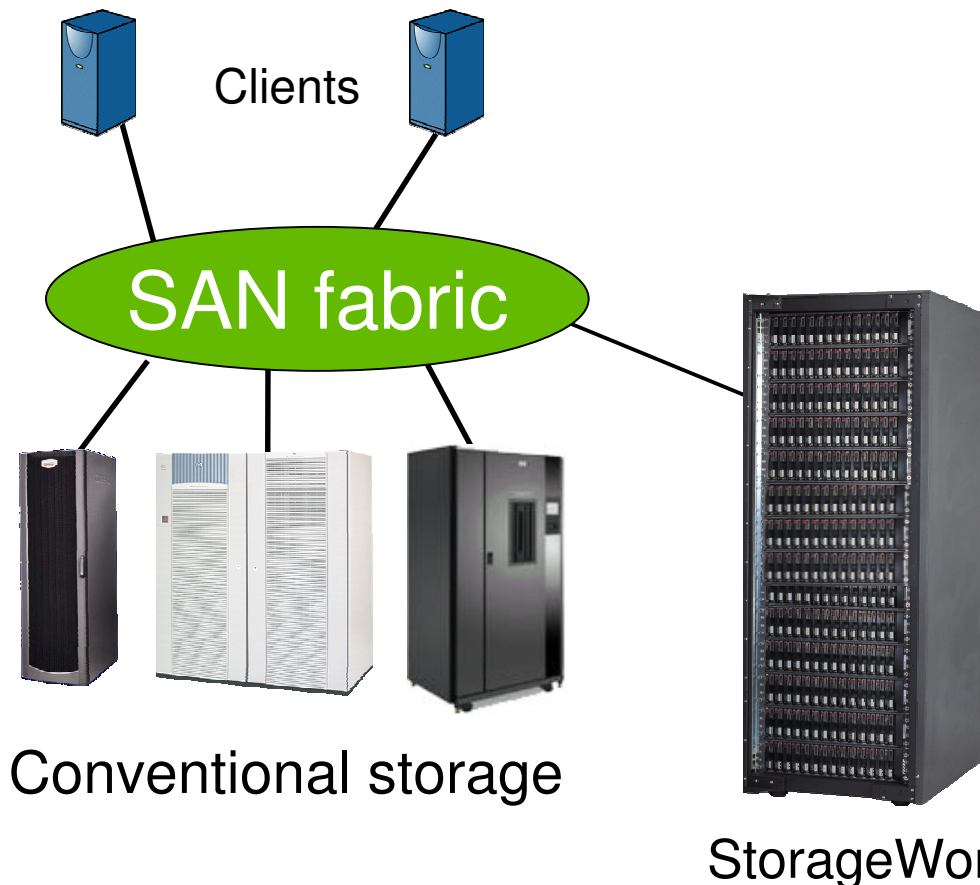
Evolving StorageWorks
with the enterprise

Key points

- Storage environments must evolve as business require
 - An Adaptive Enterprise must be able to deploy the new alongside the old
- New storage capabilities must support higher levels of enterprise agility, adaptability
 - Grid-like storage, plus enhanced manageability, support this
 - Storage grids offer scale-up, scale-down, scale-out flexibility
 - StorageWorks grids will plug into existing storage networks
- We expect customers to deploy multiple HP StorageWorks grids
 - One size does not fit all; **one managed architecture will**

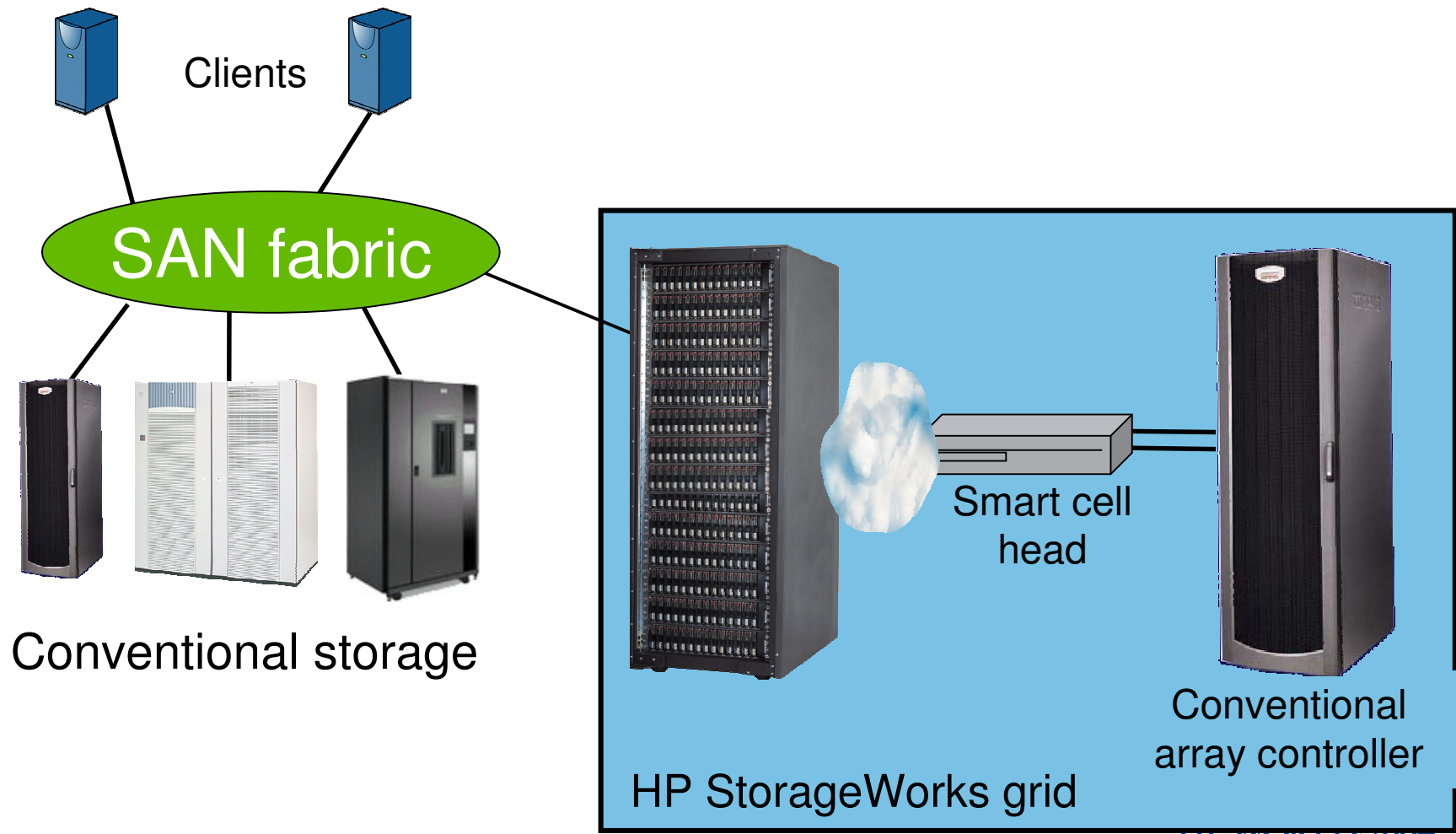


Conventional storage and the HP StorageWorks will grid coexist



- Conventional SAN infrastructure built as needed
 - FC, Ethernet, storage
- Add StorageWorks grid(s)
 - As appropriate for business needs
- Existing SAN investment is fully preserved

Conventional arrays can be added to a HP StorageWorks grid later



Summary

- StorageWorks provides the storage capabilities for the Adaptive Enterprise
 - Infrastructure and managed environment
- HP StorageWorks grid is the HP storage strategy for the adaptive enterprise
 - Evolved from the storage utility
- The HP StorageWorks grid will be compatible with existing storage
 - Total investment protection
 - Extension of historical, versatile approach



