IBM Tivoli Storage Infrastructure Management Solutions

Managing System z storage: Today and Tomorrow

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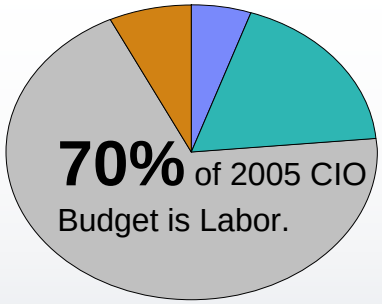
AGENDA

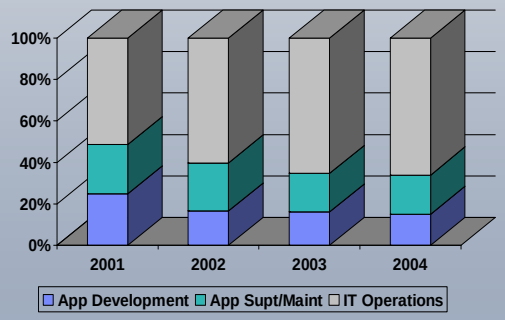
- zStorage Management Challenges
- Traditional View of IBM zStorage capability
- IBM rolling into the zStorage management arena
- Solutions in zStorage management
- IBM's System z Storage Management Future Directions
- Benefits of the IBM storage solution
- Additional storage capabilities
- Questions

Storage Management Challenges



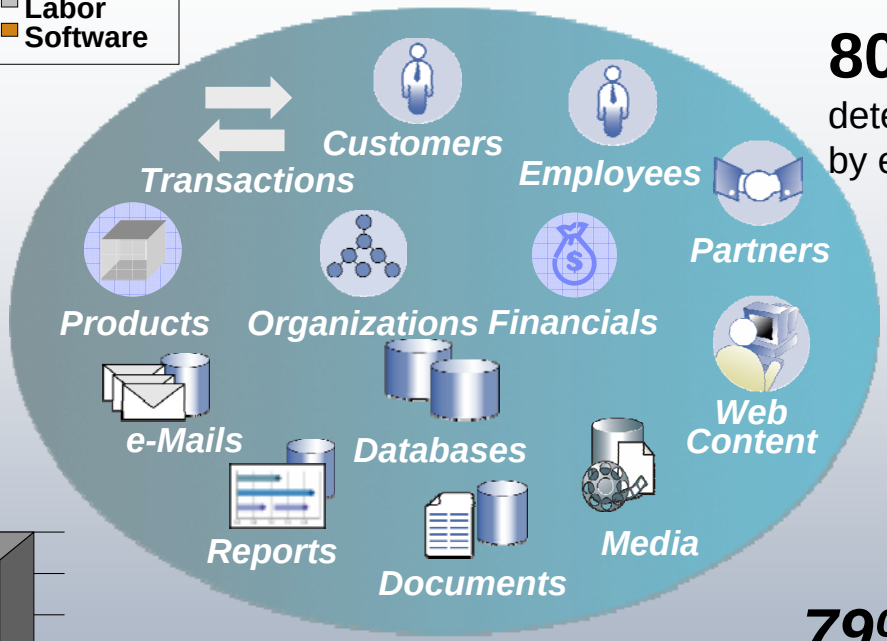
Source: Tivoli Commissioned IDC Study 1Q05

Operations labor cost is largest and faster growing part of CIO budgets today

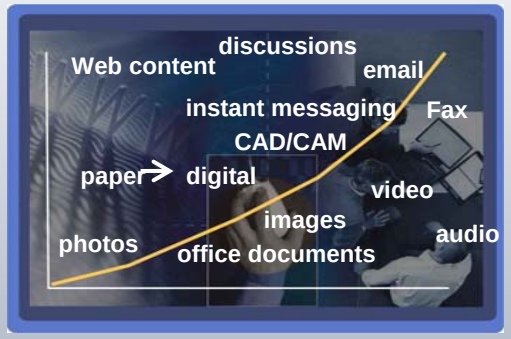


Source: Gartner Group, IT Spending & Staffing surveys

37% *CGR Disk Storage Growth '96-'07*



80% of IT problems are not detected by IT staff until reported by end users



60%+ *of CEOs: Need to do a better job capturing and understanding information rapidly in order to make swift business decisions*

79% *of companies: have 2 + repositories… (25%: have 15 +) used to store data from a large variety of information sources*

Sources: IBM & Industry Studies, Customer Interviews

Common issues in z/OS Storage Management

- Space – What's available at the Group, Volume and Dataset levels?
- Performance – Where are the slowdowns?
- Storage resources – Cache, Shared DASD, I/O subsystem, tape devices, etc.
- Applications – Are throughput problems related to DASD?
- Which logical volumes share physical disk media? – Challenges with hardware issues
- DFSMShsm – Did the maintenance cycle run well last night, Which user is generating recalls, what do I do about my HSM errors, why are there so many of them?
- Auditing and correcting DFSMShsm is time, labor and system resource intensive
- ICF Catalog – Are the catalogs and other VSAM files backed up for forward recovery, are they clean up, and do they utilize cache effectively?
- Allocations – These secondary allocation abends are killing my monthly batch cycle
- Tape – System A is always waiting on tape drives, what can we do?

- Resource constraints – Need to automate routine storage tasks to increase productivity

Traditional IBM System z Storage Infrastructure: DFSMSxxx offerings - System z Storage Capability

Provides storage, data, program, and device management functions and DFSMS Copy Services capabilities

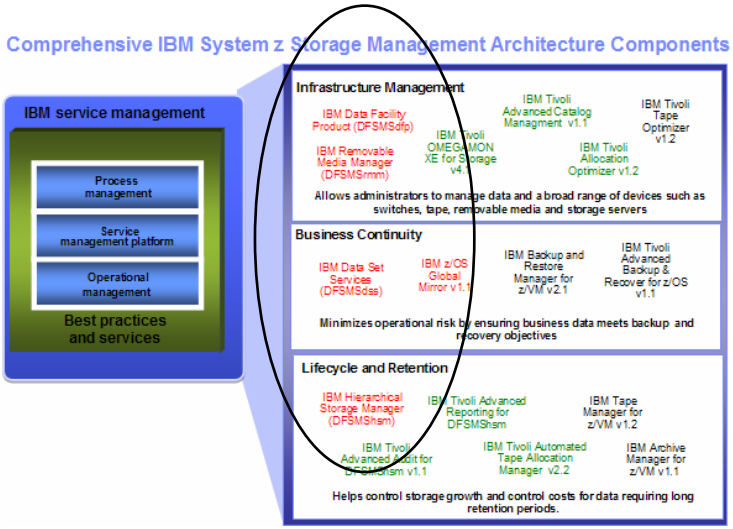
An optional feature providing backup, recovery, migration, space management functions as well as disaster recovery

An optional feature providing data movement, copy, backup, and space management functions

An optional feature providing management functions for removable media such as tape cartridges and 3420 reels

Provides, via the System Data Mover component, a comprehensive disaster recovery solution for the z/OS environment

- IBM Data Facility Prodcut (DFSMSdfp)
- IBM Hierarchical Storage Manager (DFSMShsm)
- IBM Data Set Services (DFSMSdss)
- IBM Removable Media Manager (DFSMSrmm)
- IBM z/OS Global Mirror



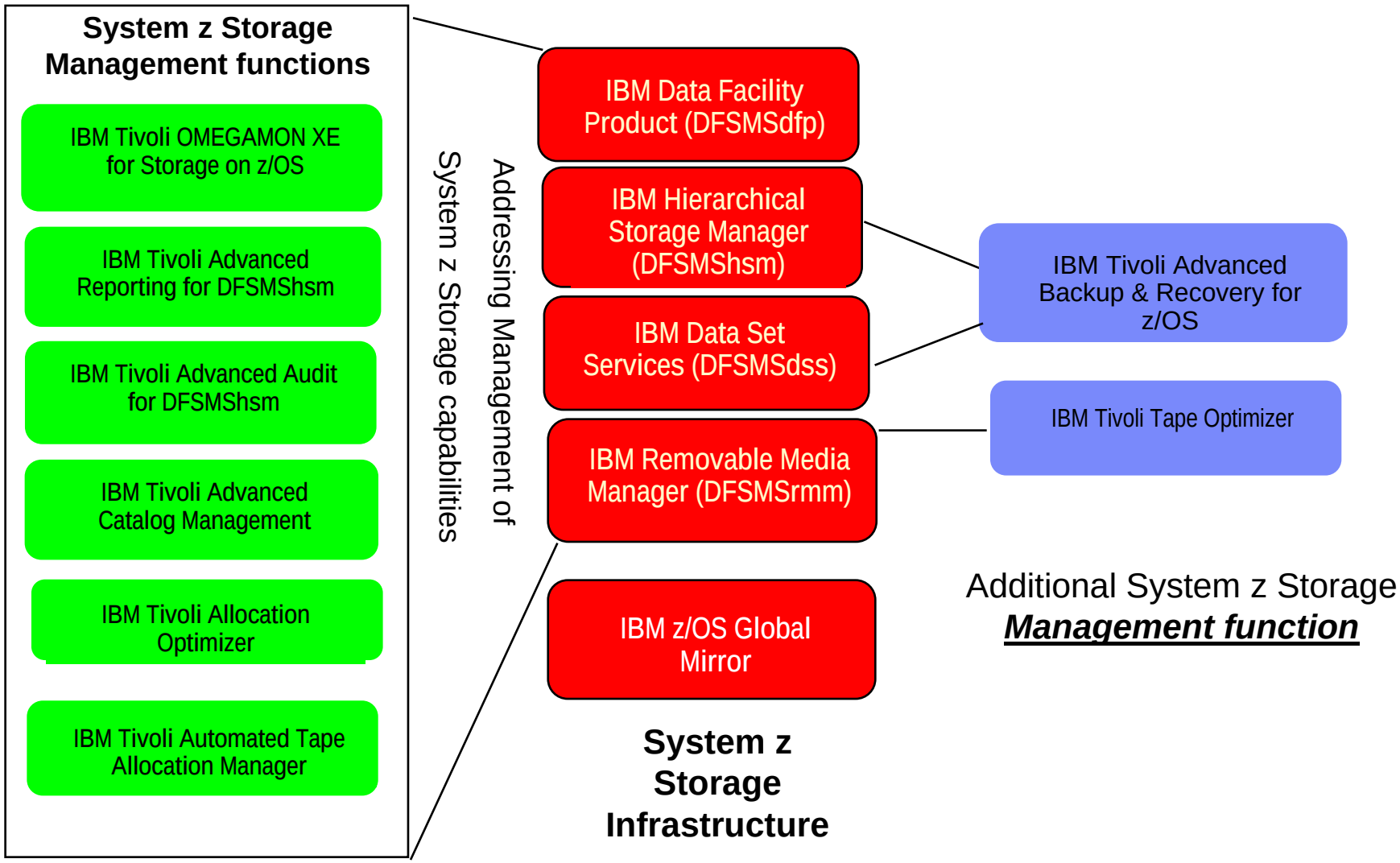
Traditionally IBM thought of as a provider of zStorage Infrastructure

- **IBM Hardware**
  - Traditional DASD storage devices, e.g. DS8000, DS6000, etc.
  - Offline storage devices, e.g. tape drives, VTS, etc.
- **Software for allocation, backup & recovery of data**
  - DFSMSdfp: Creation and allocation of datasets
  - DFSMShsm: Provides backup and recovery of datasets
  - DFSMSdss: Provides backup and recovery of logical volumes
  - DFSMSrmm: Provides offline storage library capability
- **But what about managing these basic capabilities in the zStorage environment?**

Addressing zStorage Management

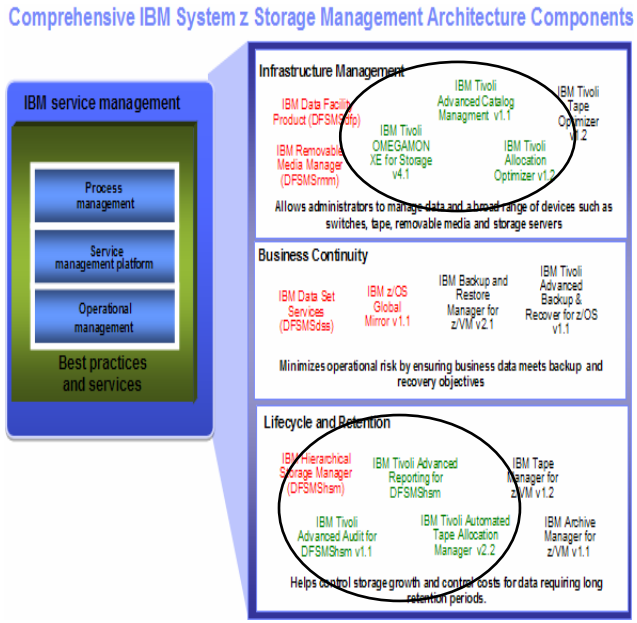
- **In 2004 IBM/Tivoli acquired Candle and the OMEGAMONs**
- **2004 to 2007 IBM/Tivoli introduce new Storage Management solutions for System z**
- **From these actions a rich and full range additional capability in the zStorage management segment have been delivered and available today!**
  - Availability management
  - Performance management
  - zStorage administration capability
  - Management capability of vital zStorage Management subsystems
  - Critical catalog management capability
  - Extended capability in the offline storage area

System z Storage Management Solutions: Added Capability



IBM System z Storage *Management Solutions* : Built to Monitor and Manage System z Storage Capability

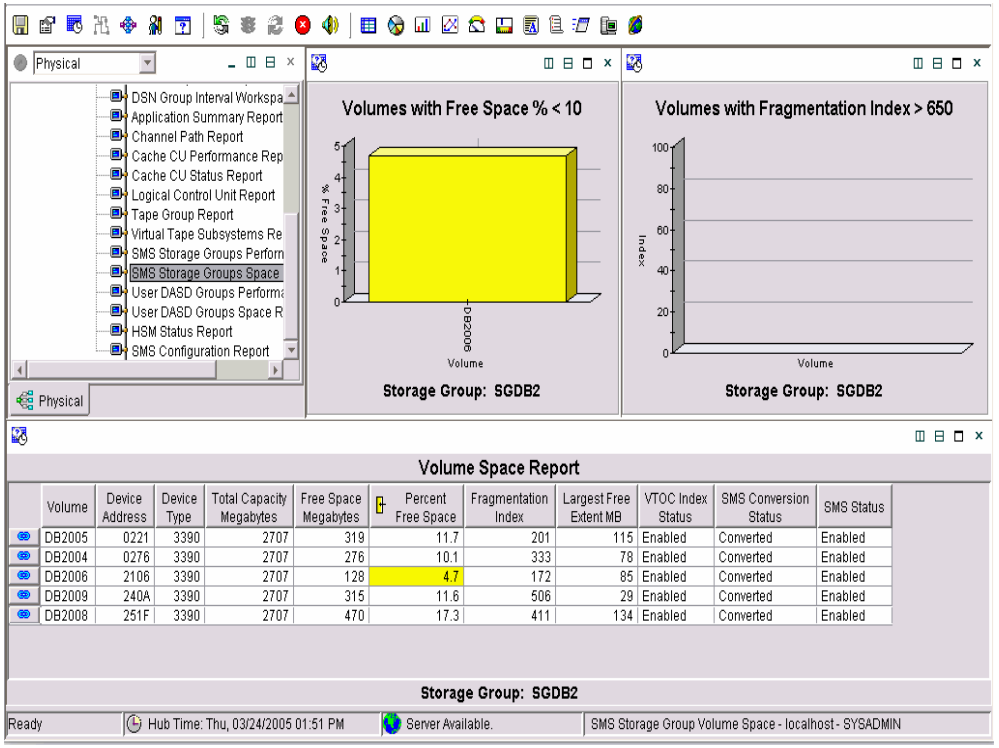
IBM System z Storage:
a unified suite of products



IBM Tivoli OMEGAMON XE for Storage on z/OS	Provides basis of System z storage monitoring and administration capability, centralized point for integration with additional storage and TEP apps (Corner Stone in Storage Toolkit)
IBM Tivoli Advanced Reporting for DFSMShsm	Provides deep dive DFSMShsm reporting capability, allowing the Storage administrator to manage DFSMShsm
IBM Tivoli Advanced Audit for DFSMShsm	Automate DFSMShsm environment auditing, and automated error correction, w/ advanced filtering
IBM Tivoli Advanced Catalog Management	Automatically ensures the entire ICF catalog and tape environment is backed up for recovery
IBM Tivoli Allocation Optimizer	Enables users to avoid and recover from common storage errors
IBM Tivoli Automated Tape Allocation Manager	Enables sharing of existing tape devices between multiple system images

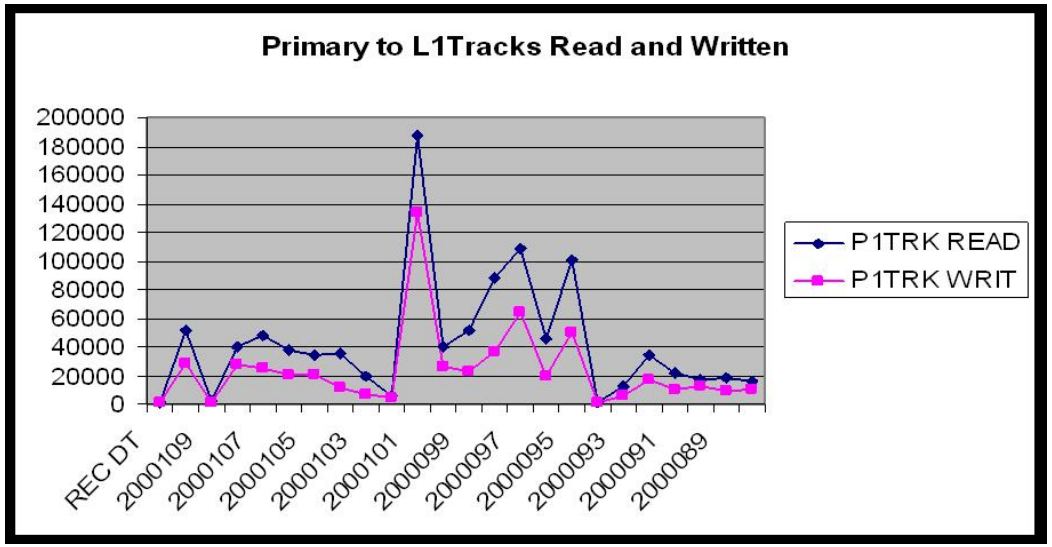
IBM Tivoli OMEGAMON XE for Storage on z/OS

- **A mainframe STORAGE monitor, real-time and historical**
- **XE user interface, comes with the CUA UI component**
- **A wide breadth of mainframe storage information:**
  - **Space (storage groups or user groups … define your own)**
  - **Performance (storage groups or user groups … define your own)**
  - **Tape / VTS**
  - **CACHE**
  - **Channels (FICON)**
  - **Control Units**
  - **DFSMShsm (View your HSM queues, control Datasets, etc.)**
  - **DFSMShsm/DFSMSdss online toolkit**
  - **SMS constructs**
  - **DS8000 support**
  - **Ability to see all logical volumes on a physical disk**
  - **Powerful applications view**
  - **Powerful dataset view and action capability**
  - **Integration capabilities from TEP interface (Launch to TPC in v4.1.0)**



IBM Tivoli Advanced Reporting for DFSMShsm

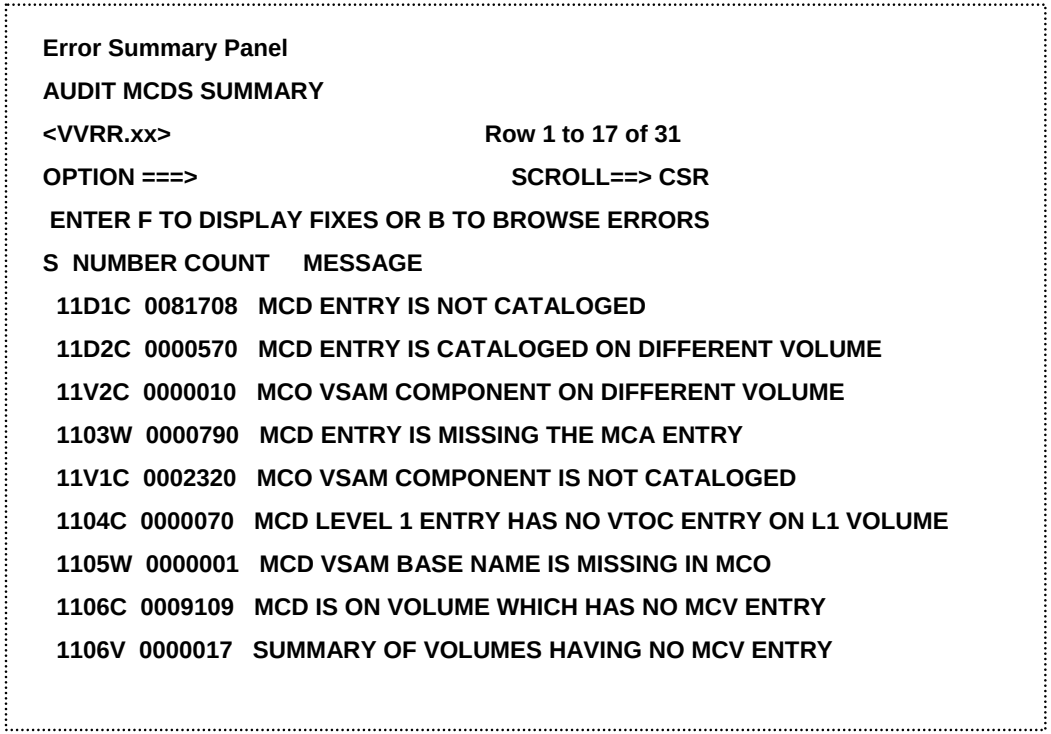
- **Provides Detailed HSM Reporting Capability**
  - Daily Health Reports
    - Provides reports for:
      - DFSMS Mounted Volumes
      - DFSMShsm Managed Volumes
      - DFSMShsm Space Management
      - DFSMShsm Automatic Backup
      - DFSMShsm Autodump Activities
    - Automatic Spreadsheet Charting
  - Ad-hoc reporting
    - Fast and highly interactive
    - Easily find areas of concern
      - Drive the view to the area of concern
      - Look around, Act on what you see
  - Perform “what-if” analysis
    - Migration thresholds
    - Recycle percent valid
  - “Plans” Feature makes new reports simple to create and save
    - Provides filtering logic so you can drill down
  - Automated command generation
    - Allows wrapping action commands around listed data sets
    - Go from “Now I know what to do” to “I’ve already done it”
    - Add your own customized commands to the command library



- **Easy-to-Use ISPF User Interface**

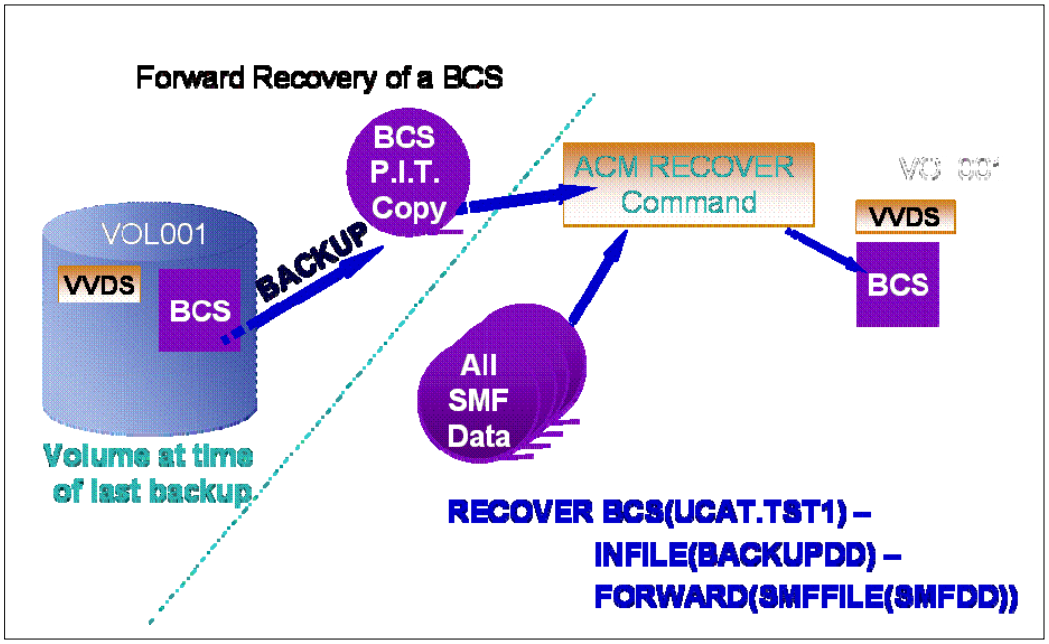
IBM Tivoli Advanced Audit for DFSMShsm

- **Audits, repairs, and ensures integrity of the DFSMShsm environment, including tape.**
- **Automates data collection and corrective actions**
- **Proactive notification and alerts to critical problems which can be expertly resolved before a system outage occurs**
- **Finds and can correct 100% of DFSMShsm errors**
- **Prove integrity of DFSMShsm environment**
- **Operates many times faster than native DFSMShsm commands, without performance impact on DFSMShsm**
- **Ease-of-Use and performance permits regular rather than periodic audits**



IBM Tivoli Advanced Catalog Management for z/OS

- **Provides powerful, safe, reliable, and easy ICF catalog and VSAM backup and *fast* forward recovery**
- **Protects a catalog's complex structural integrity, alerts for potential errors, and reduces recovery time**
- **Reduces application down-time by permitting catalog maintenance while open**
- **Allows "what-if" simulation to preview effects of actions**
- **Easy-to-use interface improves staff productivity**



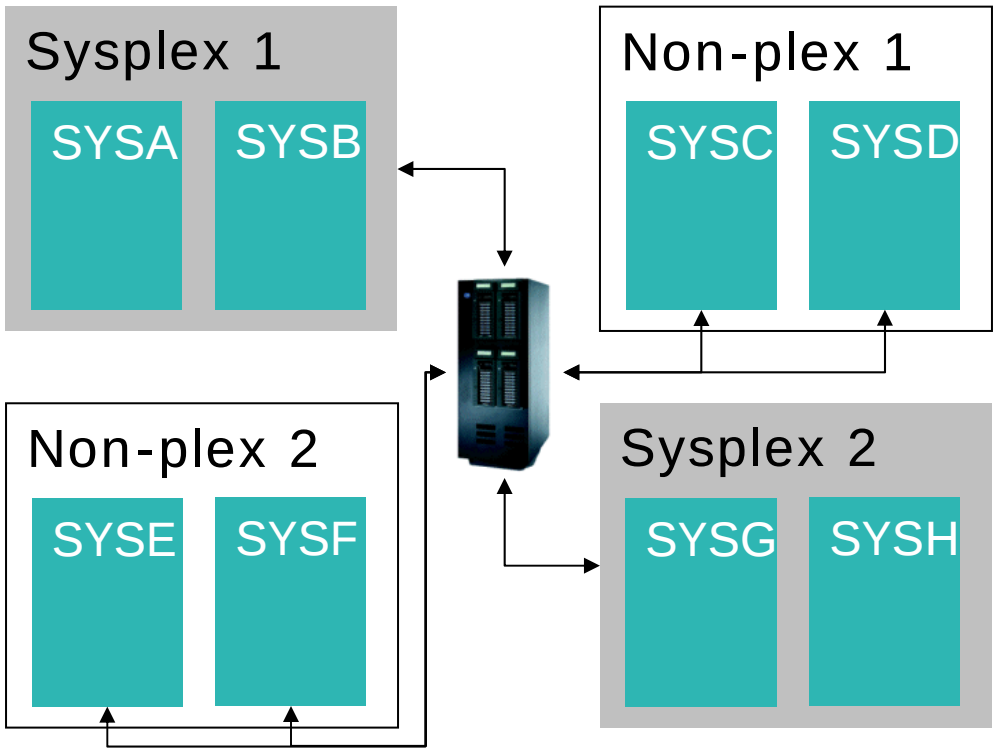
IBM Tivoli Allocation Optimizer for z/OS

Allocation Optimizer:

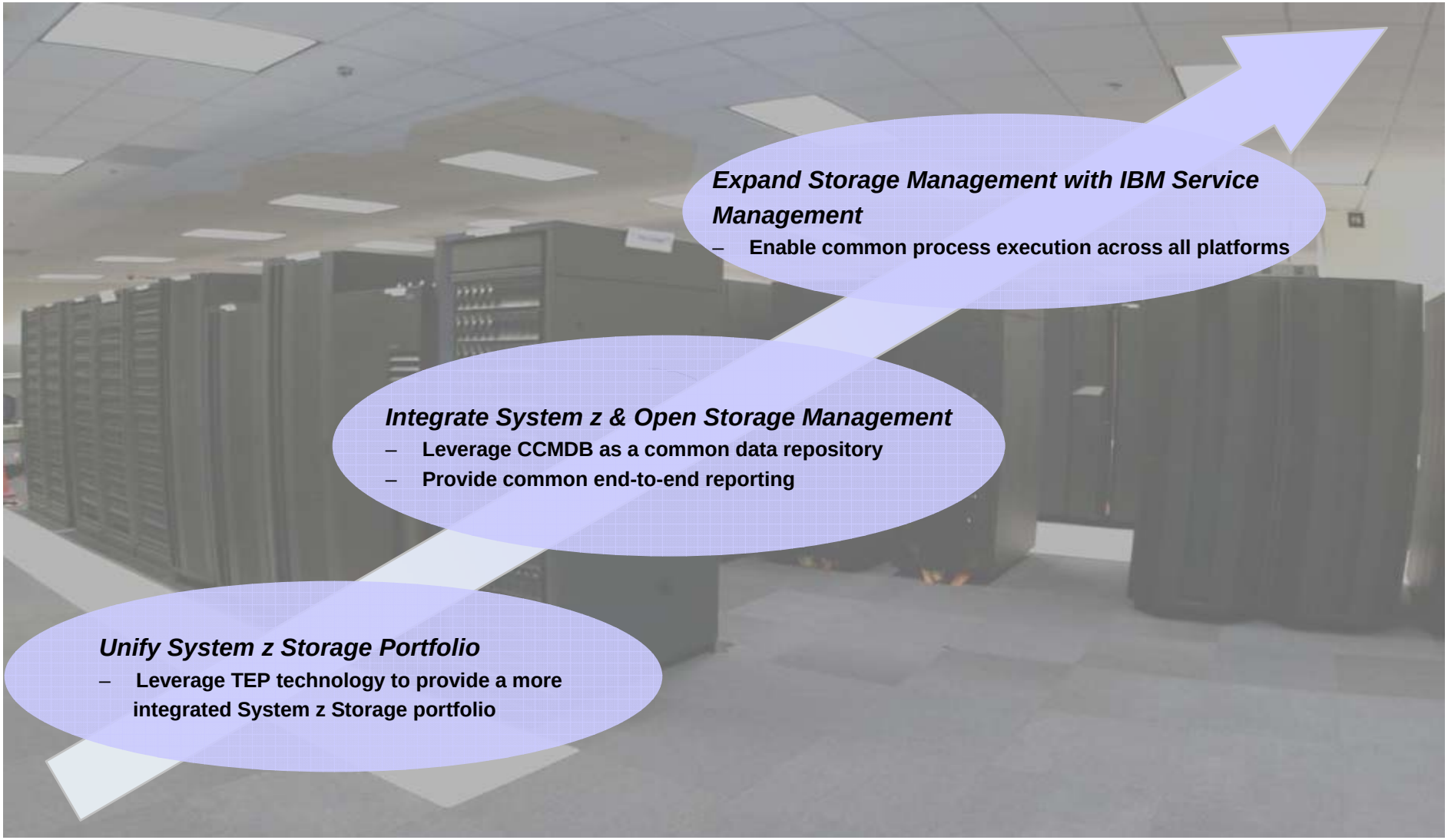
- Enables users to avoid and recover from X37 type abends such as B37, D37, and E37 abends
- Handles all DASD data sets, both SMS and non SMS-managed (VSAM and non-VSAM). Used with SMS, ***all*** unsuccessful DASD allocations are eligible for recovery
- Maximizes use of the current volume before attempting to allocate additional volumes - dynamically adjusting catalog and control blocks only when an extent is needed
- Limits fragmentation of a data set on a single volume and across multiple volumes, preserving valuable catalog space and memory-based control block storage

IBM Tivoli Automated Tape Allocation Manager for z/OS

- **Automated Tape Allocation Manager (ATAM):**
  - Enables customers to share existing tape devices between multiple images: sysplex, nonplex, multiple standalone in any combination including legacy devices such as 3420
- **Improves Operational Efficiency:**
  - Maximize the use of existing tape devices
  - Reduce operational overhead
  - Minimize backlogs of job requests
  - Improve the ROI on tape hardware investments
  - Support hardware acquisition decisions
  - Architecture**:** Since ATAM operates at the Hardware Level, it exploits the fact that an autoswitchable device can only be online and allocated to one system at a time
  - Availability: Single Point of Control without the Single Point of Failure – ATAM does not need to coordinate device allocation information through a shared control file
  - Responds automatically and directly to user/job resource requests
  - Responds to requests at “machine speed” instead of “operator speed”
  - Real-time and historical reporting – built-in

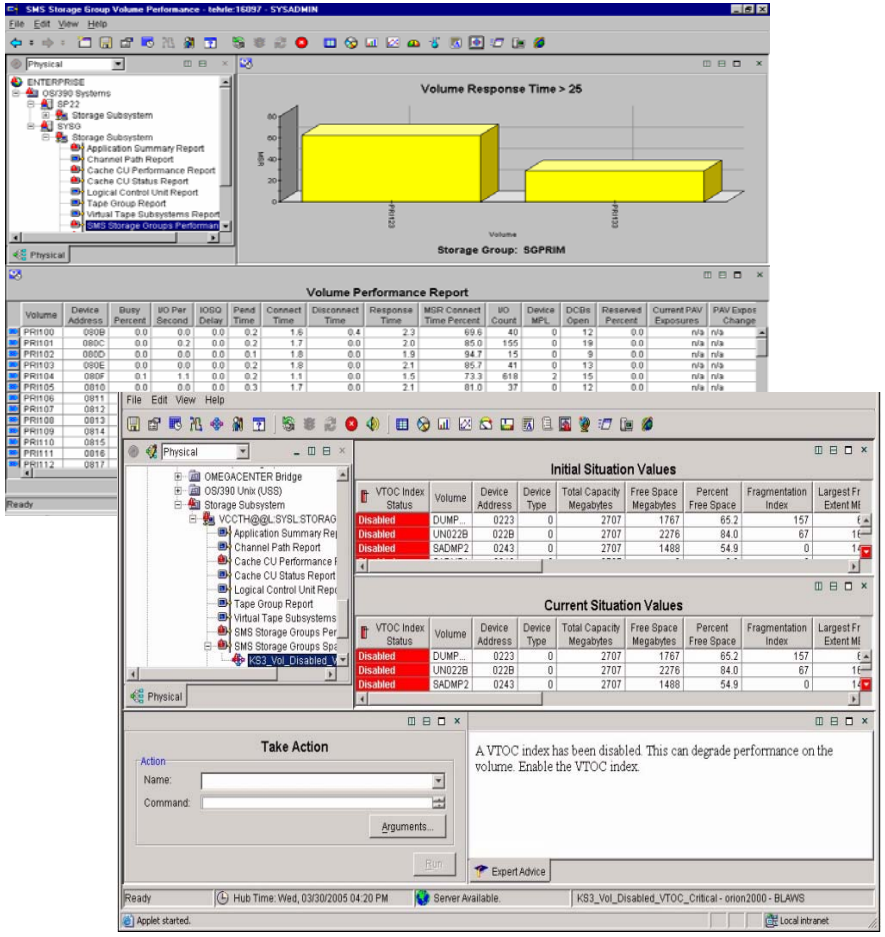


IBM's System z Storage Management Future Directions

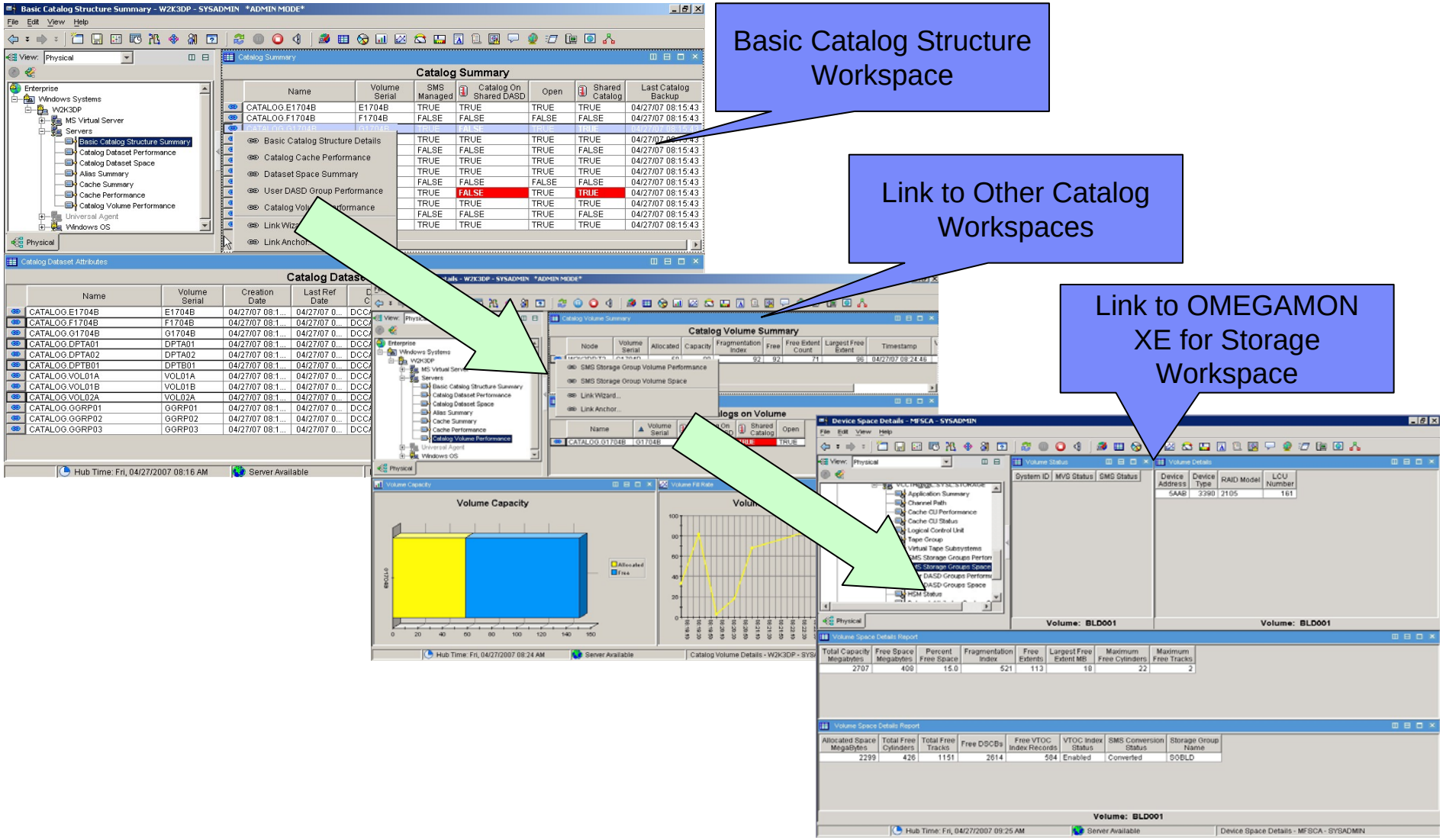


The Tivoli Enterprise Portal (TEP)

- **Advanced interoperability via workspace linkages**
  - Enhances and improves problem resolution
  - TN3270 and Browser interface
- **Leverage the information from multiple sources**
- **Capability of creating alerts using multi-level logic as opposed to just threshold setting**
- **Ability to see alerts and associated information about the problem from the same interface**
- **Reflex automation capabilities (take action)**
- **Provide information about a situation through the Expert Advise feature**
- **Real-time, near term and long term history**



Dynamic Workspace Linking in zStorage Management



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Expand Storage Management with IBM Service Management

The industry's most comprehensive set of products, services and solutions

IBM Service Management

- Process Management Products
- Service Management Platform
- Operational Management Products
- Best Practices

- CRM & Business Management
- Service Delivery & Support
- Service Deployment
- Information Management
- Business Resilience

Change and Configuration Management Database (CCMDB)

- Business Application Management
- Server, Network & Device Management
- Storage Management
- Security Management

- IBM Tivoli Unified Process (ITUP)
- Open Process Automation Library (OPAL)
- IBM Global Technology Services
- Ecosystem of System Integrators and Business Partners

System z Storage Management Solution working together and providing value

- **IBM Tivoli OMEGAMON XE for Storage on z/OS**
  - Monitor and manage in both real-time and historical space, performance, offline storage, DFSMShsm activity, DFSMSdss, track applications (ASIDs), take actions and expert advise minimizing and avoiding outages while improving efficiency
  - Integration with other solutions via TEP, corner stone in a storage management tool box
- **IBM Tivoli Advanced Reporting for DFSMShsm**
  - Provides deep dive reporting of DFSMShsm logs, identify thrashing, maximize the efficiency of your DFSMShsm day to day activity and environment
- **IBM Tivoli Advanced Audit for DFSMShsm**
  - Ability to quickly audit, identify and correct DFSMShsm errors that cause costly outages, waste of resources, and time
- **IBM Tivoli Advanced Catalog Management**
  - Provides the capability to manage your ICF Catalogs, audit alias, view structures, and make sure that your ICF catalogs are backed up appropriately helping in a complex specialized area of Storage management
- **IBM Tivoli Allocation Optimizer**
  - Ensures no costly space allocation problems by avoiding X37 abends
- **IBM Tivoli Automated Tape Allocation Manager**
  - Provides the capability to share tape resources in a DFSMSrmm environment, maximizing your investment

System z Storage Management Solution Benefits

- **Solve zStorage management issues with:**
  - Space, Performance, Administration, DFSMShsm, ICF Catalogs, Off Line Storage, Problem Avoidance, Resources (DASD, Channel, Cache, Tape Drives, etc.)
- **Reduce problems**
  - Precise alerts tailored to your environment
  - Automated actions based on alerts
- **Maximize efficiency**
  - Dramatically reduce time to audit and correct DFSMShsm errors
  - Efficiently utilize resources (online and offline storage)
- **Productivity through integration**
  - Offerings complement each other and will become more tightly integrated
  - Seamless integration to other TEP enabled IBM products

Additional System z Storage Management Solutions

IBM Tivoli Advanced Backup & Recovery for z/OS	**Automatically identify critical datasets, ensure backups w/o duplication, quickly recover from disasters or local outages**
IBM Tivoli Output Manager	**Captures and distributes enterprise data from z/OS applications**
IBM Tivoli Tape Optimizer	**Tape copy and stacking solution for data residing on tape storage devices**
IBM Tape Manager for z/VM	**Tape and device management for z/VM systems. Includes sharing devices with other z/VM and non-z/VM systems**
IBM Backup and Restore Manager for z/VM	**Provide backup and restore capabilities for z/VM and guest data (such as Linux)**
IBM Archive Manager for z/VM	**Manage z/VM disk space more efficiently by archiving infrequently used files, recalling as needed**

Contacts:

Your local IBM Representative

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Q&A session

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