IBM Systems and Technology Group

Achieving Near-Continuous Availability with New IBM zSeries Solutions

Dan Sunday
zSeries Business Continuity and GDPS Technical Support
dsunday@us.ibm.com

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

AIX*
CICS
DB2
e-business logo*
Enterprise Storage Server*
FICON
FlashCopy*
GDPS*
HyperSwap
IBM*
IBM eServer
IBM logo*
iSeries
MQSeries*
NetView*
OS/390*
Parallel Sysplex*
pSeries*
S/390*
Sysplex Timer*
Tivoli Storage Manager
TotalStorage*
VSE/ESA
WebSphere*
X-Architecture
xSeries*
z/Architecture
z/OS*
z/VM*
zSeries*

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries
UNIX is a registered trademark of The Open Group in the United States and other countries.
Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.
SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

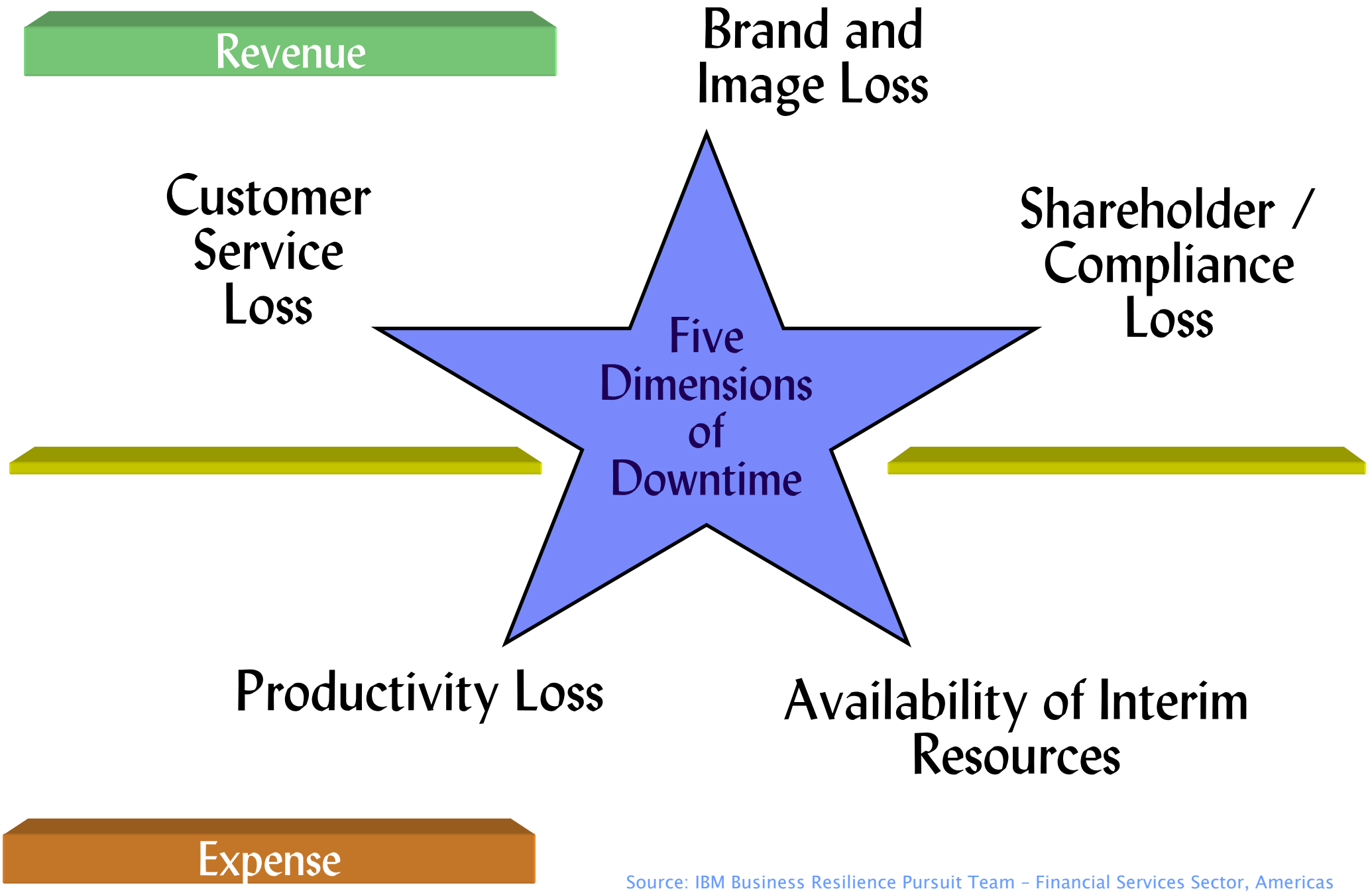
Agenda

- Current Environment
- Technologies
- Solution Positioning
- Summary

Current Environment

"We have to achieve growth in revenues while also controlling the risks."
CEO Survey

- **Resilience is hot with multiple monikers!**
- **CEOs must drive growth**
- **CEOs will improve efficiency in cost and resources**
- **Industry leaders will drive towards better responsiveness to customers, stockholders, employees, industry competition**
- **Technology communities keep challenged to align I/T to business goals to grow revenue**
- **Pressure continues to staff for effectiveness & optimization**
- **Managing Risk, Compliance, Resilience are growth drivers**



Source: IBM Business Resilience Pursuit Team – Financial Services Sector, Americas

Customers want to know…
What Business Problem(s) does Business Resilience Solve?

Suggested Definition:

Business Resilience is the ability to adapt and respond to risks, as well as opportunities, in order to maintain continuous business operations, be a more trusted partner, and enable growth.

1. **Continuity of Business Operations - help our business become more anticipatory, adaptive, and robust, from IT to all business processes (take orders, ship, manufacture, etc.).**
2. Regulatory Compliance - **help our business comply with new government rules and regulations more quickly and cost effectively.**
3. Reduce the cost of Risk Management - **help us stay competitive by managing risk more efficiently and cost effectively.**
4. Security, Privacy & **Data Protection - help us protect our business against threats both internal and external, and develop a critical information management strategy.**
5. Expertise and Skills (Outsourcing or Training) - **help us obtain and program manage the expertise and skills necessary to maintain continuous business operations.**
6. Maintaining Market Readiness - **help us stay competitive by anticipating and quickly responding/adapting to changes in market requirements, and accelerate R&D to ensure that we have the right products, at the right place, at the right time.**
7. Becoming a more attractive Partner - **help us partner more quickly and effectively within our industry by becoming a trusted and reliable business partner in our Supply Chain or Value-Net.**

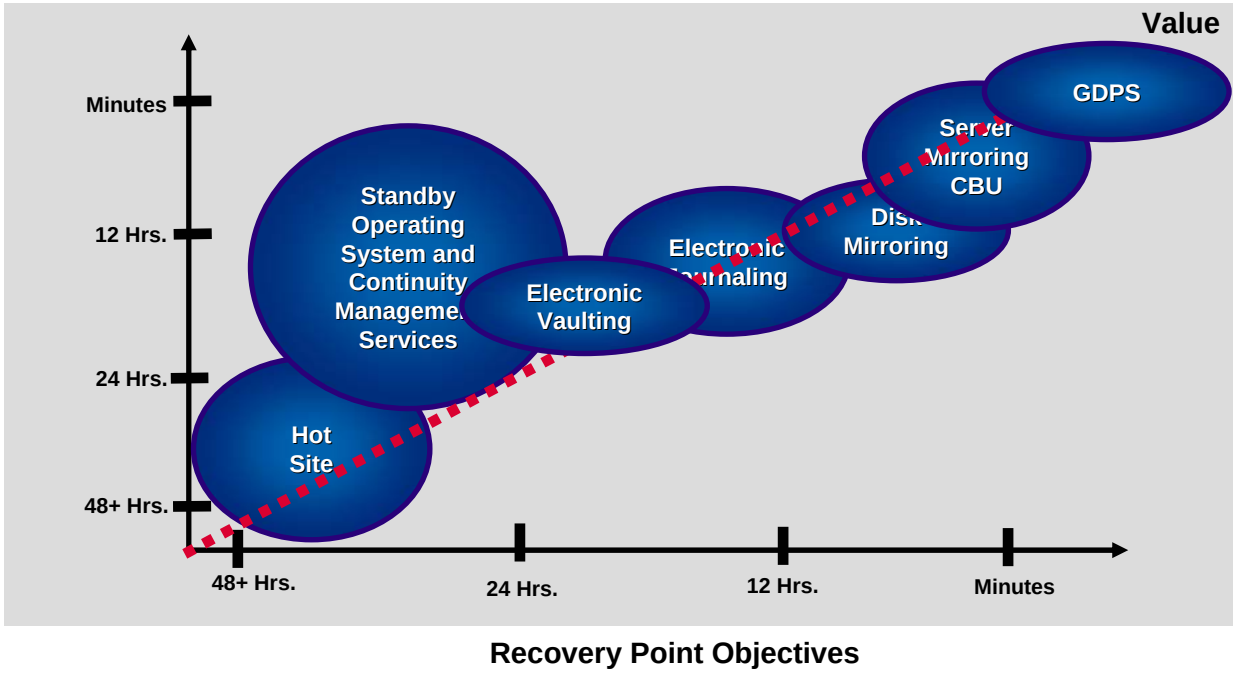
Findings clustered into…a VERY diverse set of business problems.

the Fact Point group

Match Strategy to Business needs

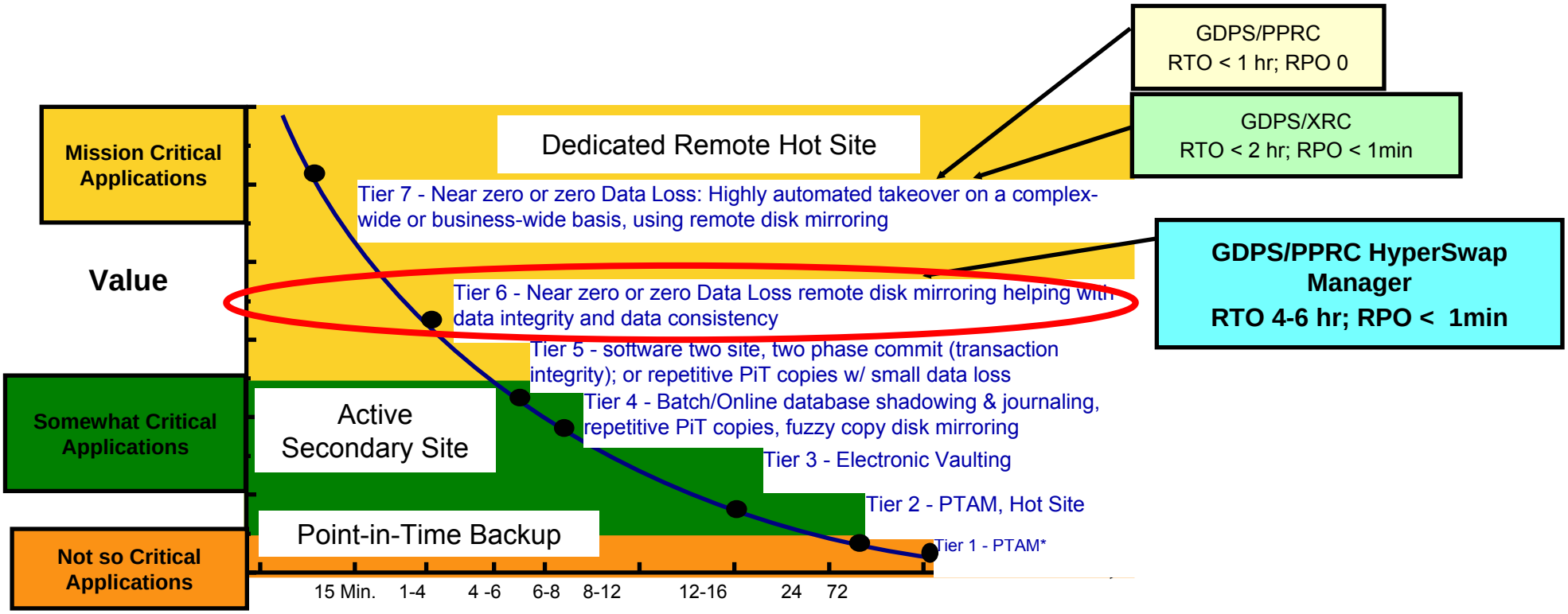
Find the balance between cost and availability for <u>each</u> business process

- **A successful business continuity strategy will:**
  - **Address vital business processes**
  - **Involve business and IT decision makers**
  - **Go beyond traditional backup/recovery and disaster planning solutions**
  - **Make continuity a part of every new systems plan**
  - **Become part of IT change management process**



Understanding the *RTO and RPO vs. cost curve* is the key to selecting a solution

Tiers of Disaster Recovery: Level Setting GDPS



Tiers based on Share Group
*PTAM = Pickup Truck Access Method

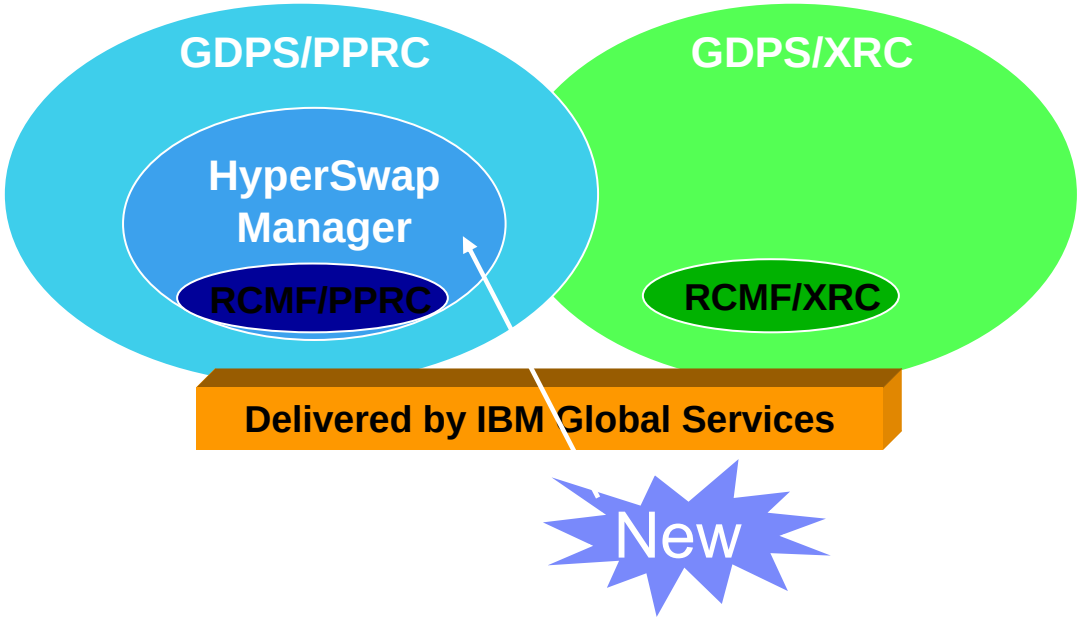
Best D/R practice is blend tiers of solutions in order to maximize application coverage at lowest possible cost . One size, one technology, or one methodology doesn't fit all applications.

Agenda

- Current Environment
- Technologies
- Solution Positioning
- Summary

What is GDPS?

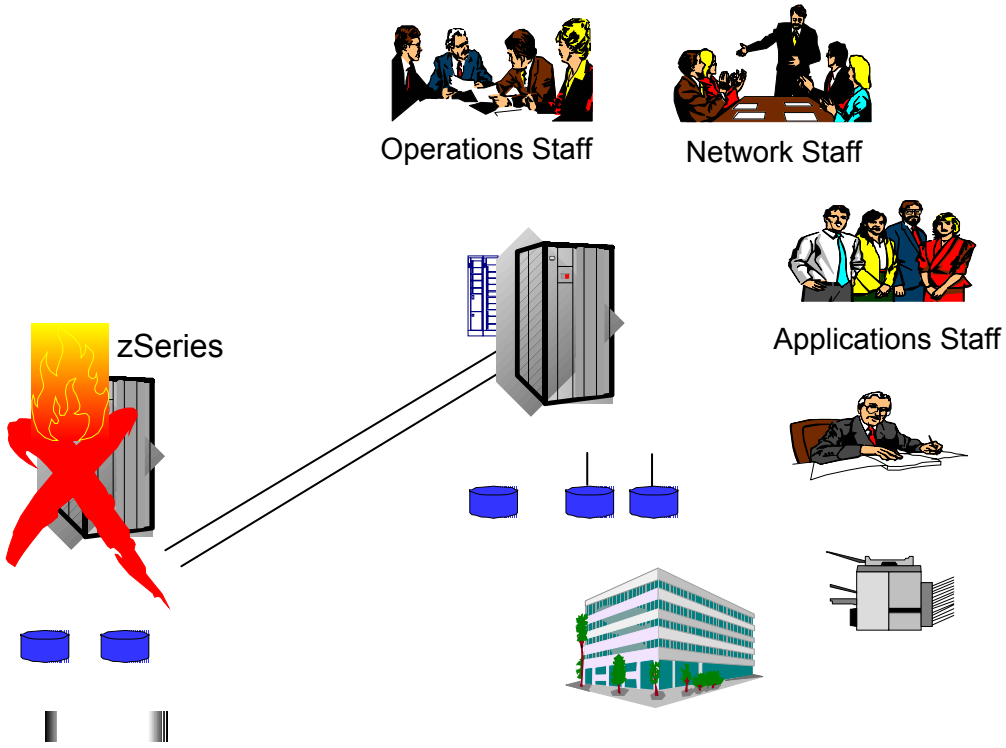
- **Automated solution that manages application and data availability in and across sites**
  - **Monitors systems, disk & tape subsystems**
  - **Builds on Sysplex and data mirroring technologies**
  - **Manages planned and unplanned exception conditions**
    - **Disk maintenance / failure**
    - **System maintenance / failure**
    - **Site maintenance / failure**



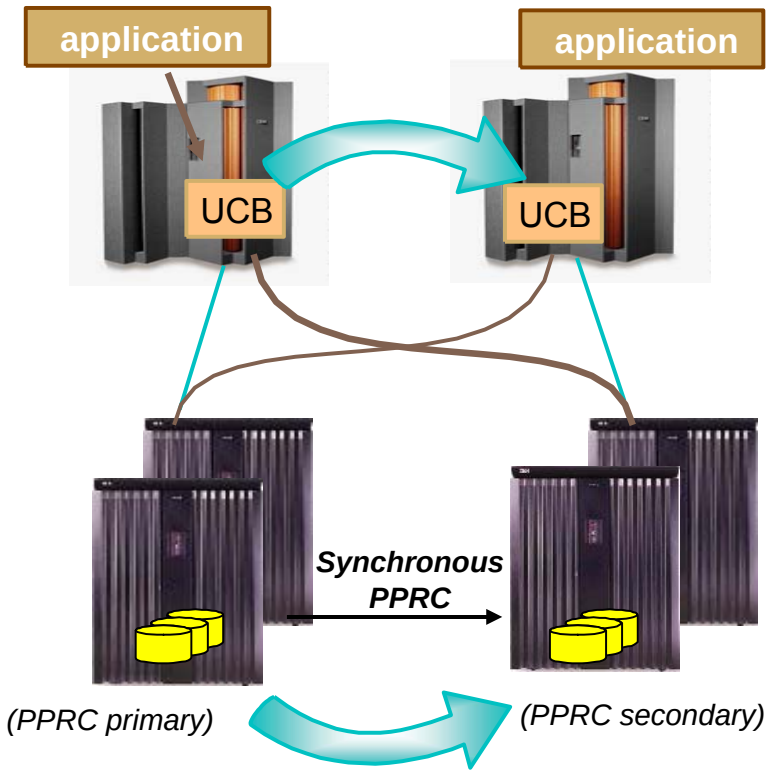
Designed for Near-Continuous Application & Data Availability
Single point of control
Delivered through IBM Services

Today's Business Continuity Objectives Demand Rapid Database Availability

- **Achieve Application and Database Restart**
  - Consistent, repeatable, fast
  - **Database Restart:** To start a database application following an outage without having to restore the database
    - **This is a process measured in minutes**
- **Avoid Application and Database Recovery**
  - Unpredictable recovery time, usually very long and very labor intensive
  - **Database Recovery:**
    - **Restore last set of Image Copy tapes and apply log changes to bring database up to point of failure**
    - **This is a process measured in hours or even days**



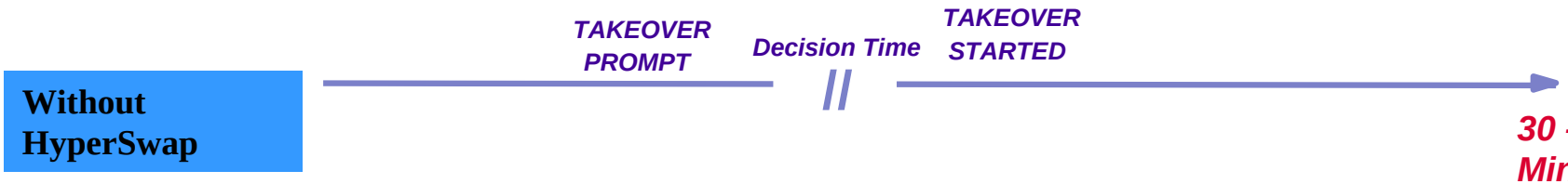
zSeries Near Continuous Availability - *using PPRC and GDPS HyperSwap*



GDPS HyperSwap

- **Designed to Provide Continuous Availability of Data for zSeries**
  - Facilitated by new PPRC microcode functionality and z/OS® IOS code
- **GDPS HyperSwap™ is:**
  - Integration of very fast swapping of PPRC'd disk subsystems with z/OS, zSeries hardware, and GDPS
  - Switching to alternate copy of zSeries data can be accomplished in seconds to minutes
  - Supported on Synchronous PPRC
- **Intended Benefits:**
  - **Designed to offer continuous availability of data**
    - *Disk Maintenance*
    - *Site Maintenance*
    - *Data Migration*
    - *Disk Failure*
    - *Site Failure*
  - **Fast and Scalable zSeries Enterprise Data Center Swap:** scales to very large configurations
  - **Repeatable, reliable, confident recovery:** No operator interaction, GDPS automation managed

Benchmark Measurements – Unplanned Disk Reconfiguration



With HyperSwap No Failover/Failback

18 Seconds! (2900 vol pairs 4.6 TB)

Initial copy of all volumes required to restore to original configuration

terminate PPRC, swap the primary & secondary PPRC UCBs, systems continue

With HyperSwap AND Failover/Failback

15 Seconds! (2900 vol pairs 4.6 TB)

Only changed data needs to be copied to restore to original configuration

PPRC Failover, swap the primary & secondary PPRC UCBs, systems continue

Benchmark Measurements – Planned Disk Reconfiguration

Without HyperSwap — *PLANNED ACTION INITIATED* → *1-2 hrs (approx)*

With HyperSwap No Failover/Failback → *93 Seconds! (2900 vol pairs 4.6 TB)*

terminate PPRC, swap the primary & secondary PPRC UCBs, systems continue

With HyperSwap AND Failover/Failback → ***18 Seconds!*** *(2900 vol pairs 4.6 TB)*

PPRC Failover, swap the primary & secondary PPRC UCBs, systems continue

Reference Customer	Configuration	Switch Time (without FO/FB)	Switch Time (with FO/FB)
ARZ (Austria)	2300 vol pairs (14 TB) (Note 1)	82-84 secs	
Postbank (Germany)	1800 vol pairs (32 TB)	80-84 secs	
iT Austria (Austria)	4200 vol pairs (24 TB)	75 secs	
iT Austria (Austria)	4500 vol pairs (76 TB)	75 secs	
IBM test facility (MOP)	2900 vol pairs (4.6 TB)	93 secs	18 secs
	Note 1:TB depends on 3390-3 or 3390-9 type vols		

Agenda

- **Current Environment**
- **Technologies**
- **Solution Positioning**
  - CA of Data within a Single Site
  - Metropolitan Distance CA of Data/DR Solution (2 site)
  - GDPS/PPRC Multi Platform Resiliency for zSeries
- **Summary**

GDPS Solution Suite

Continuous Availability of data

Solution	Target Customer	Value
GDPS/PPRC HyperSwap Manager	**Parallel Sysplex**	**CA of z/OS and Open Systems data**

Metropolitan Distance (CA/DR) 2 sites

Solution	Target Customer	Value
RCMF/PPRC	**Disk Mirroring**	**PPRC Management Ease of Use**
GDPS/PPRC HyperSwap Manager	**Entry Level Disaster Recovery z/OS & Open data**	**CA of data: Site failure protection RTO depends on customer automation RPO = 0/< 1 min**
GDPS/PPRC Sysplex/PPRC across 2 sites Single site or Multisite workload	**DR, zSeries + Open data, CA of data**	**Planned & Unplanned reconfiguration RPO=0; RTO< 1 hr**
GDPS/PPRC (BRS Config.) Sysplex in one site, PPRC across sites	**DR, zSeries + Open data**	**Planned & Unplanned reconfiguration RPO=0; RTO< 4 hrs**

Unlimited Distance (D/R) 2 sites

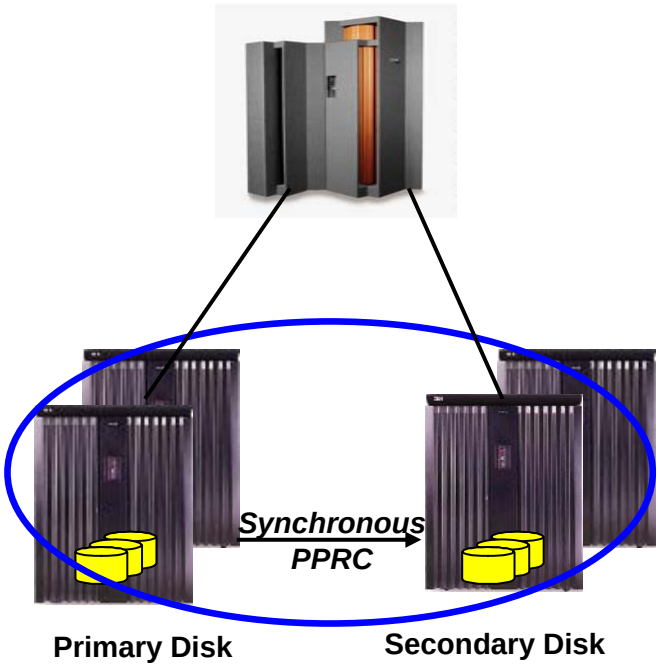
Solution	Target Customer	Value
RCMF/XRC	**Disk Mirroring**	**XRC Management Ease of Use**
GDPS/XRC	**zSeries Disaster Recovery**	**Site failover RPO < 2 min RTO = 1-2 hrs**
GDPS/Global Mirror (1)	**zSeries + Open Disaster Recovery**	**Site failover RPO < 5 secs Target RTO = 1-2 hrs**

CA/DR 3 sites - Metro + Unlimited distance

Solution	Target Customer	Value
GDPS/PPRC & GDPS/XRC (zSeries data)	**Economically essential businesses; Ultimate in BR**	**Metro distance CA for zSeries data + unlimited distance DR**

(1) Previewed – Jan 25 2005

GDPS - The World Class Disaster Recovery and Near Continuous Availability Solution for z/Series Now Extended to Storage and Linux



New – Lower cost offering provides near continuous access to data within a Sysplex

- ***GDPS/PPRC HyperSwap Manager***
- Proven component of GDPS/PPRC with a migration path to full GDPS/PPRC

Legendary z/OS availability extended to Linux

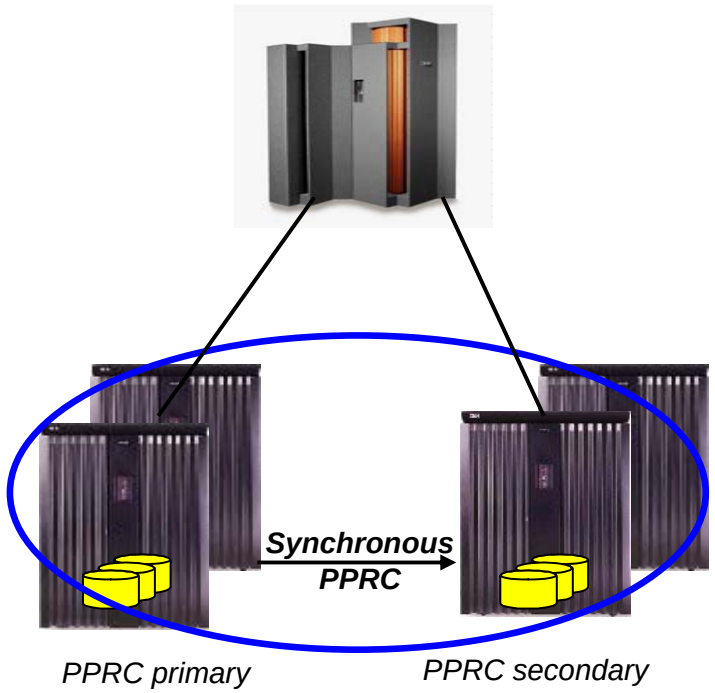
- ***GDPS/PPRC Multi Platform Resiliency for zSeries***
- Exploits GDPS/PPRC HyperSwap function to switch to secondary disks using z/VM

GDPS/PPRC HyperSwap
Estimated to eliminate over 90% of application outages due to storage subsystems failures

Solution Positioning

Near Continuous Availability of Data within a Single Site

Near Continuous Access to Data for High Availability Within a Data Center

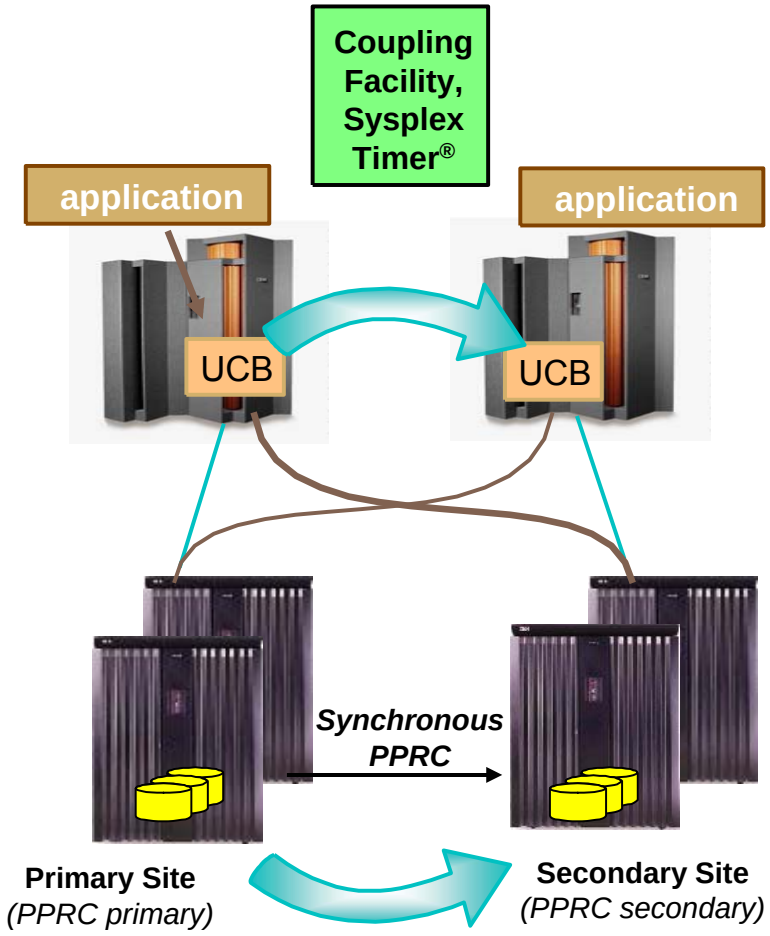


- **Intended Benefits:**
  - Designed to reduce outages caused by disk failures
  - Designed to provide automated failover to secondary devices
  - Designed to keep operating systems and applications available
  - Designed to reduce planned outages
- **GDPS/PPRC HyperSwap Manager** is:
  - GDPS/PPRC code designed to manage remote copy environment using HyperSwap function
  - Spans ***single or multiple*** subsystems and attached zSeries, providing high scalability
  - Designed to be easily upgradeable to full GDPS
- Solution applies to:
  - Any zSeries configuration using Synchronous PPRC

Solution Positioning

Metropolitan Distance Near Continuous Availability of Data / Disaster Recovery Solution (2 site)

Near Continuous Access to Data for High Availability and Site Disaster Recovery in a Multi-site Environment



GDPS HyperSwap

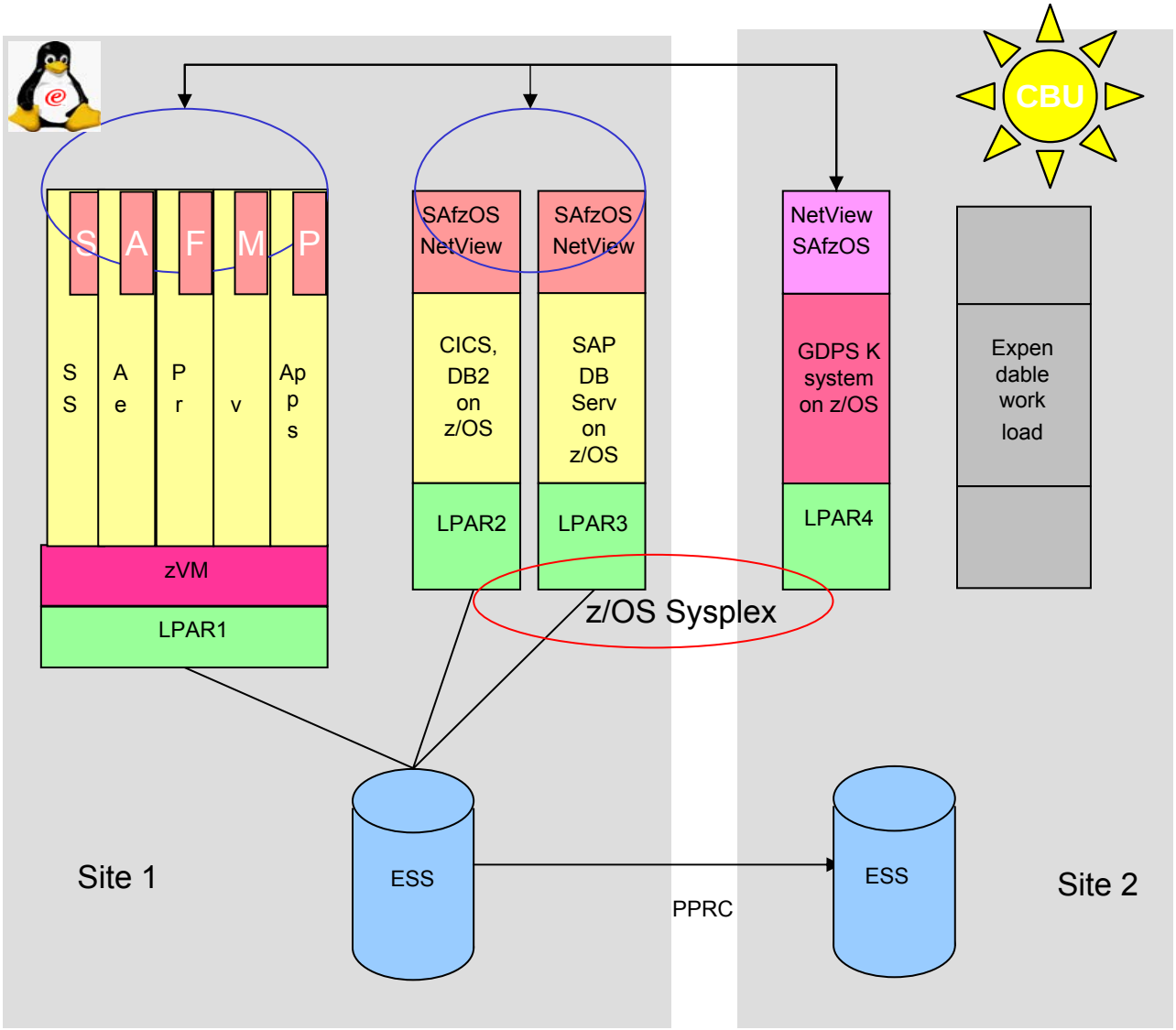
- **Intended Benefits:**
  - Designed to reduce outages caused by disk failures
  - Designed to provide automated failover to secondary devices
  - Designed to provide data consistency in the event of a site loss
  - Designed to reduce planned outages
- **GDPS/PPRC HyperSwap Manager** is:
  - GDPS/PPRC code designed to manage remote copy environment using HyperSwap function
  - Spans ***single or multiple*** subsystems and attached zSeries, providing high scalability
  - Designed to be easily upgradeable to full GDPS
- Solution applies to:
  - Any zSeries configuration using Synchronous PPRC

IBM Systems Group

Solution Positioning

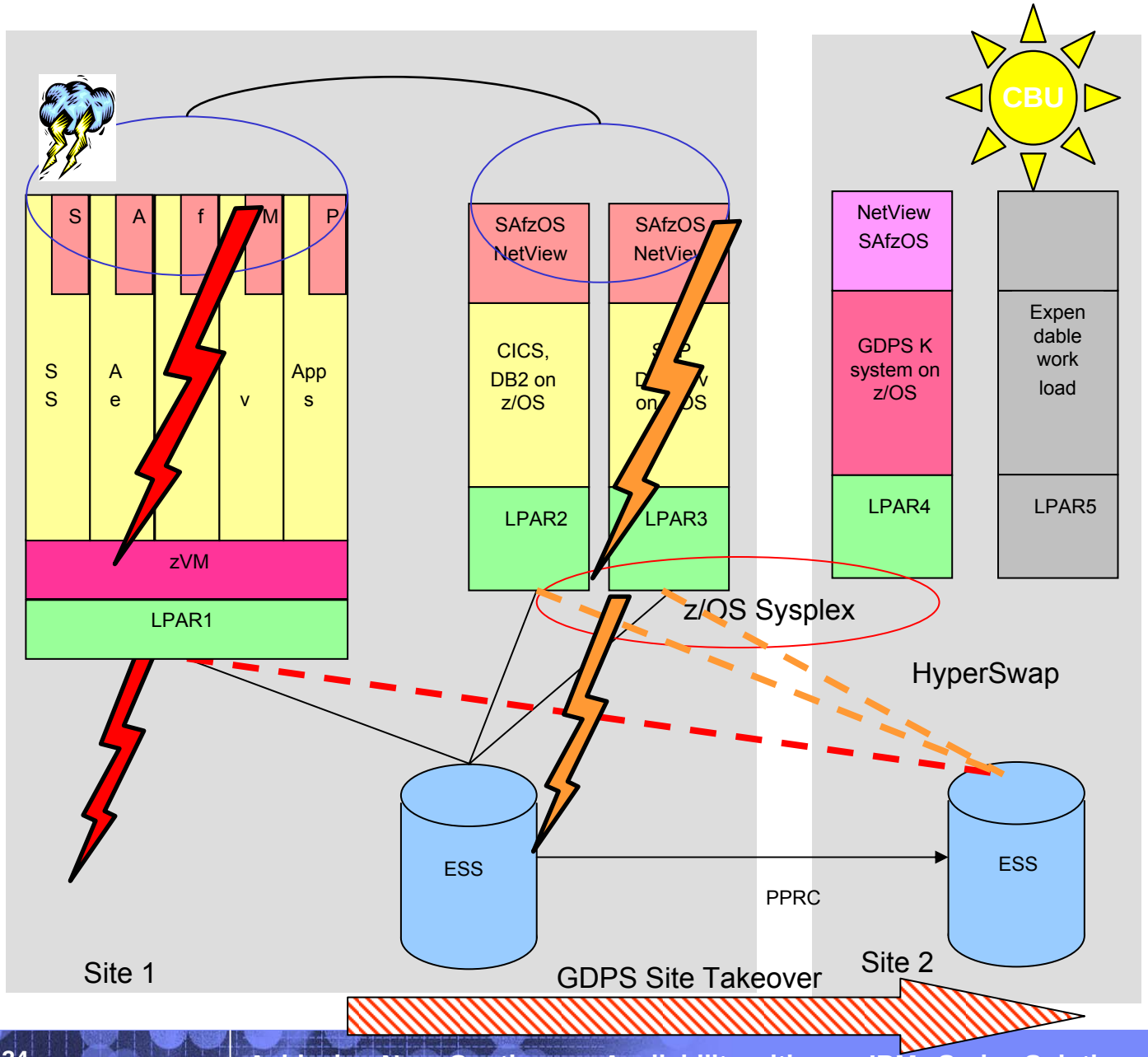
GDPS/PPRC Multi-Platform Resiliency for zSeries

GDPS/PPRC Multi Platform Resiliency for zSeries



- Valuable to customers with distributed applications
  - **SAP application server running on Linux on zSeries;**
  - **SAP DB server running on z/OS**
  - **etc.**
- Coordinated near-continuous availability and DR solution for z/OS and Linux guests running under z/VM
- GDPS exploits z/VM HyperSwap function to switch to secondary disks mirrored by PPRC

GDPS/PPRC Multi Platform Resiliency for zSeries – Site 1 Failure



GDPS/PPRC provides planned and unplanned reconfiguration capabilities for Linux on zSeries and z/OS

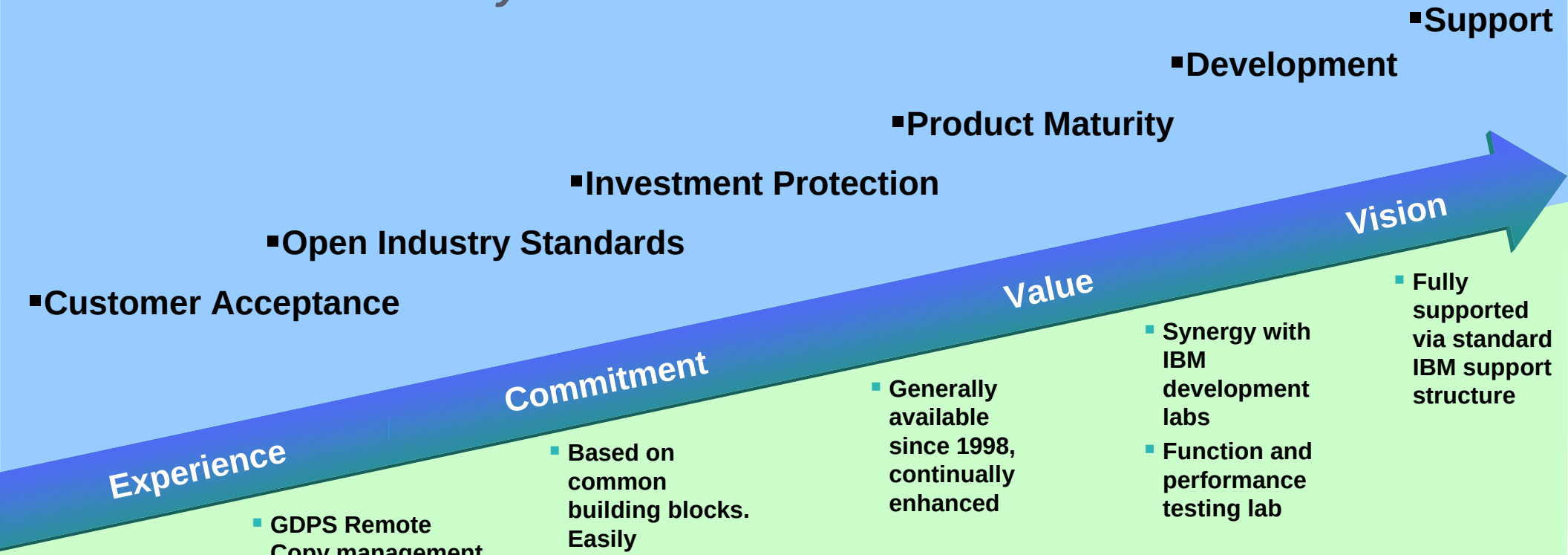
- **Unplanned site takeover triggered by Linux on zSeries or z/OS**
  - **Coordinated HyperSwap across both z/OS and z/VM disks**
  - **Stop expendable work in site 2 and/or invoke CBU**
  - **Restart Site 1 production systems in site 2**
- **Planned coordinated HyperSwap or site takeover also supported (control script)**

Agenda

- Current Environment
- Technologies
- Solution Positioning
- Summary

GDPS Value Proposition

The Ultimate Availability Solution

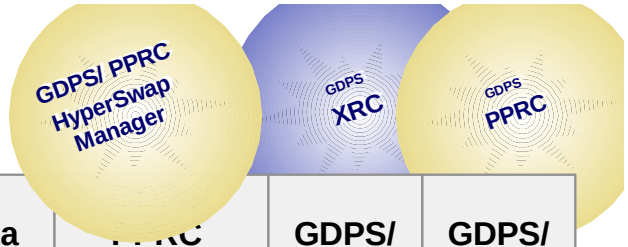


"Using the GDPS/PPRC hyperswap technology is a significant step forward in achieving continuous availability. The benefits in our GDPS environments are that a site switch by means of hyperswap (i.e., dynamic switching of the disk configuration) ***takes only a few minutes without application outage****. Without hyperswap we had to shutdown the GDPS/Sysplex, switch the disk configuration, and restart systems and applications. The elapsed time was almost two hours for our largest GDPS with 11 systems and over 11,000 PPRC volume pairs."*

Wolfgang Dungl, Manager of Availability, Capacity and Performance Management

Wolfgang Schott, GDPS Project Manager ***iT-AUSTRIA***

GDPS vs other D/R options



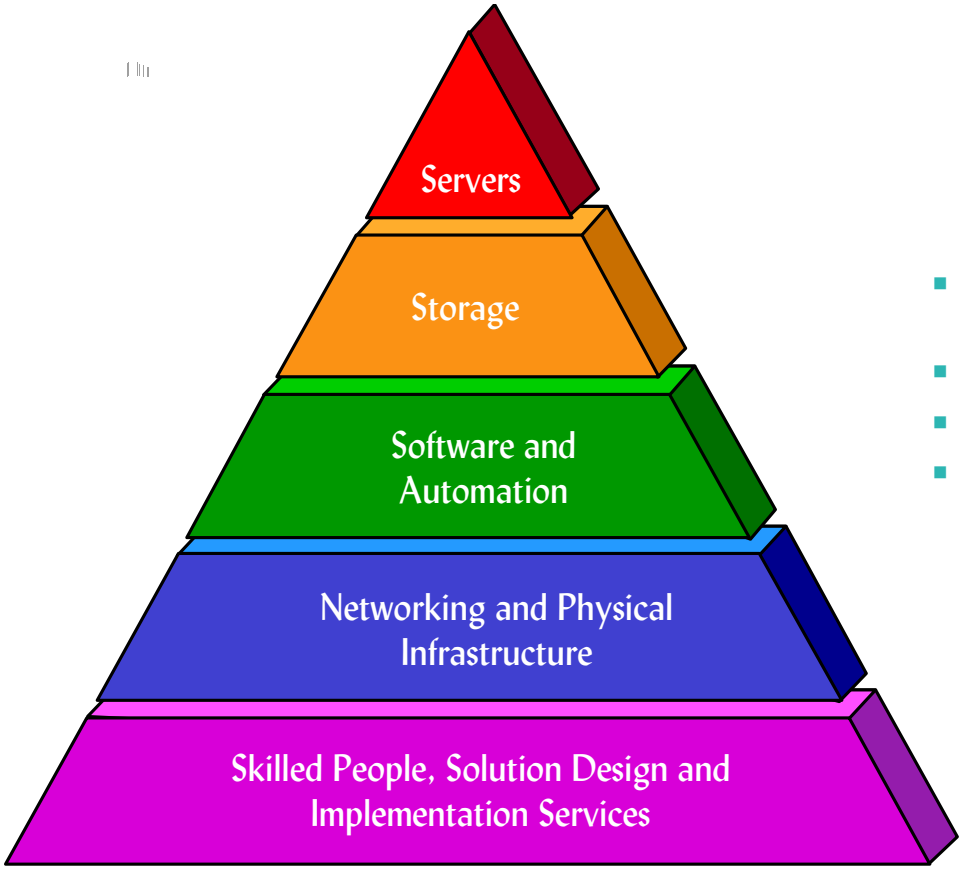
planned

Unplanned

D/R

GDPS Offering /Function	PTAM	Electr Vault	Data Repl	Data Mirr	HyperSwap Mgr	GDPS/ XRC	GDPS/ PPRC
Event monitoring					+	+	+
Remote copy config. mgt.					+	+	+
Application/system Start-up/shutdown						+	+
Disk subsystem maint.					+		
User defined actions						+	+
Application failure						+	+
zOS image failure						+	+
Processor failure						+	+
CF failure						+	+
Disk subsystem failure				?	+	+	+
Tape subsystem failure				?		+	+
Site failure	+	+	+	+	+	+	+
Sysplex-wide freeze					+	+	+
Recovery Point Objective	24-48h	12h	<5m	0/<1m	0/<1m	<1m	0/<1m
Recovery Time Objective	24-48h	24-48h	12-24h	4-6h	Depends on cust automation	<2h	<1h

Best Practices for Business Continuance *Summary*



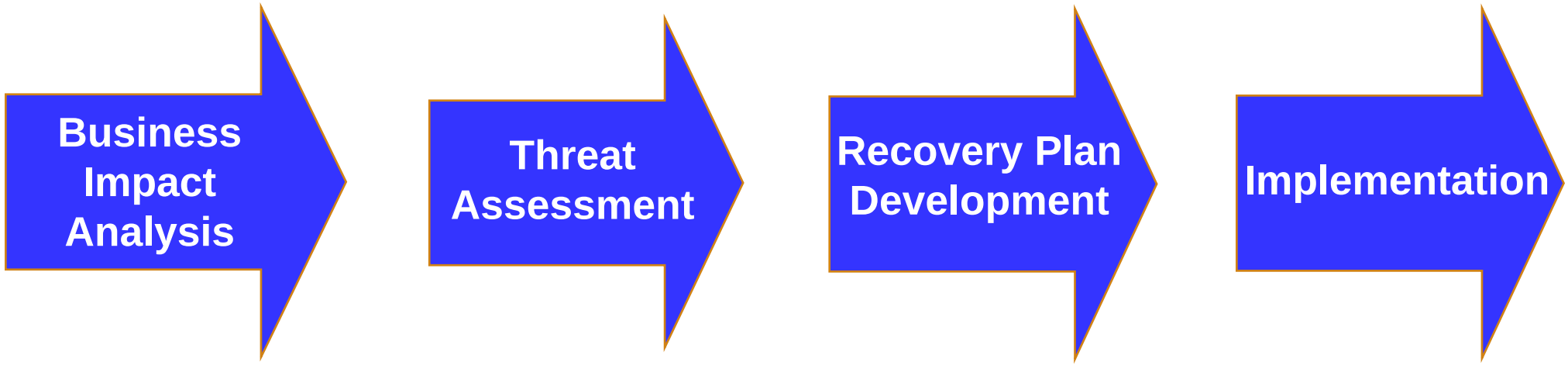
- Approach Business Continuance as a ***comprehensive business recovery solution***
- **Determine the *best Architecture***
- Use the ***Tiers*** method to select technology
- ***Blend and balance*** the five necessary IT components into a cost-effective D/R solution:

- Servers
- Storage
- Software and Automation
- Networking
- Services

Additional Information

- **GDPS Information e-mail:**
  - gdps@us.ibm.com
- **Web Pages References**
  - GDPS Home Page
    - http://www-1.ibm.com/servers/eserver/zseries/gdps/
  - Business Continuity and Recovery Services
    - http://www-1.ibm.com/services/us/index.wss/it/bcrs/a1000411
- **White Papers:**
  - *Business Continuity Considerations and the IBM eServer zSeries*
    - *http://w3-1.ibm.com/sales/systems/portal/_s.155/254?navID=f380s280&geoID=All&prodID=zSeries&docID=gm130256*
  - *GDPS - The Ultimate e-business Availability Solution*
    - *http://www-1.ibm.com/servers/eserver/zseries/library/whitepapers/gf225114.html*
- **Publications:**
  - *TotalStorage Disaster Recovery Solutions Redbook* – SG24-6547-01
  - *z/OS Advanced Copy Services* – SC35-0428
  - ESS Copy Services on zSeries Redbook - SG24-5680
  - ESS Copy Services on Open Redbook – SG24-5757

IBM Delivers End to End Solutions



IBM Global Services: Management Consulting to Implementation Detail

Critical System Software and Application Expertise

Outstanding Server and Storage Solutions