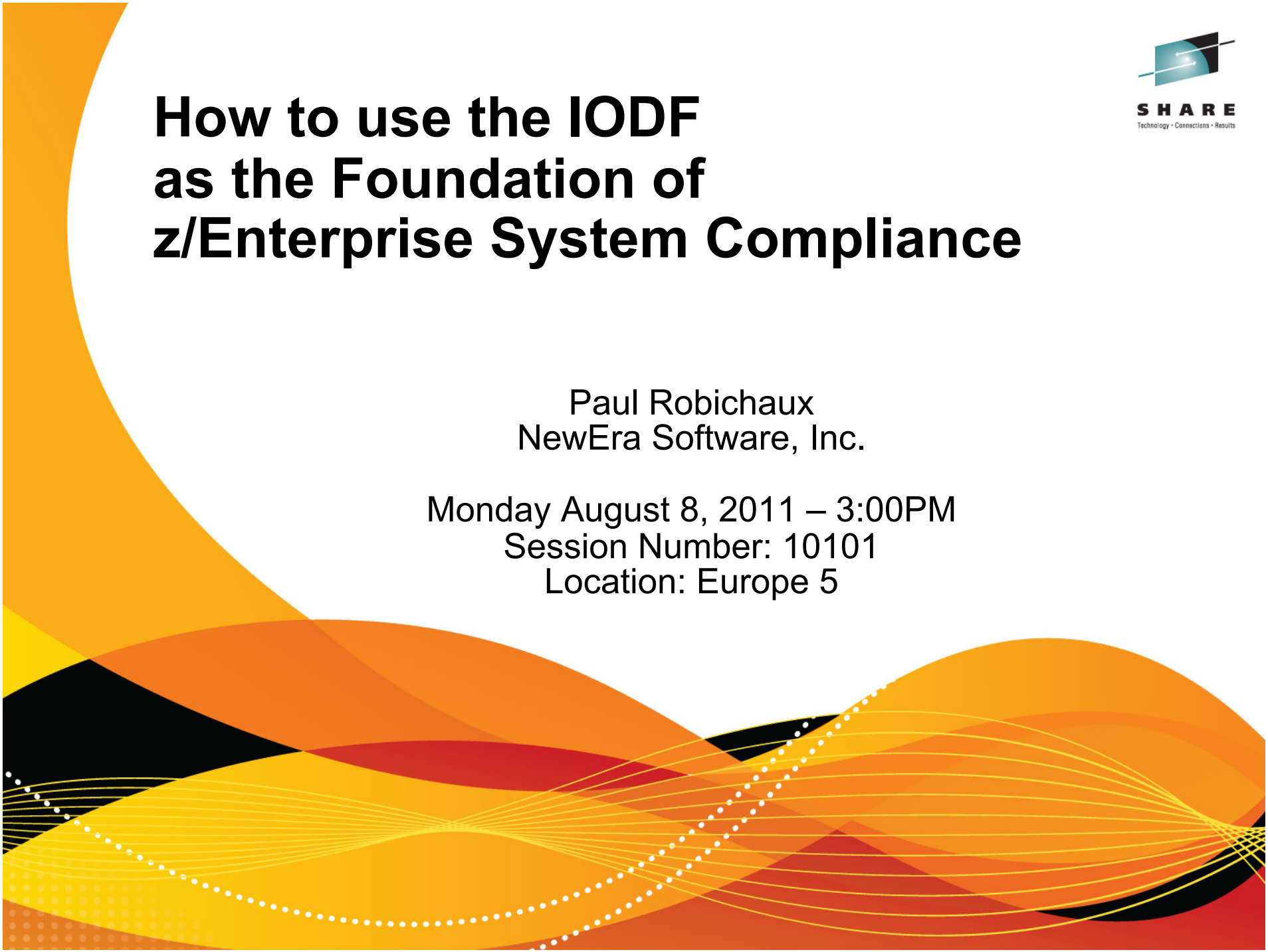
How to use the IODF as the Foundation of z/Enterprise System Compliance

Paul Robichaux
NewEra Software, Inc.

Monday August 8, 2011 – 3:00PM
Session Number: 10101
Location: Europe 5



Abstract and Speaker

• IBM's zEnterprise Server, AKA the Mainframe, and its companion Operating System z/OS combine to create the most powerful and secure transaction processing environment available to your clients. With a single server capable of supporting thousands of users, accessing hundreds of databases and generating billions of financial transactions per day, the z/Enterprise is an Audit target of material interest and should be included within the scope of any Information Technology Audit.

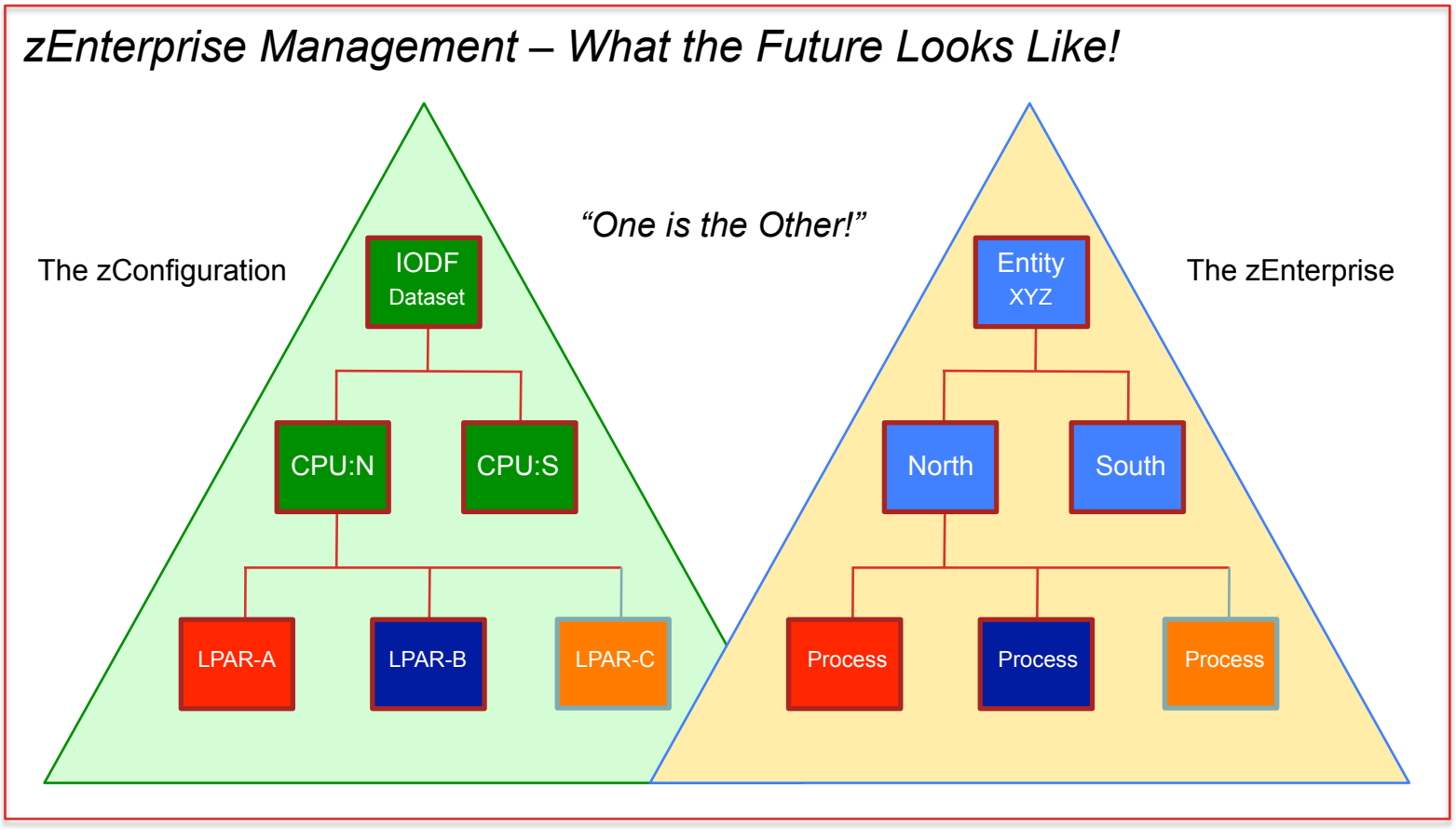
• The presentation will place emphasis on the adoption of the Input/Output Definition Files (IODF) as the central point of control for establishing a verifiable baseline of z/Enterprise elements. This session will introduce you to:

- The Mainframe Software Stack (MSS), it's Cost and Abatement Strategies.
- The Basics and Interactions of the zEnterprise Hardware and Software Configuration.
- The importance of the IODF in understanding the origin of System Vulnerability.
- The coming revolution in zEnterprise Configuration Management.
- Recommended IODF Management Best Practices.
- No Cost Strategies for detecting Changes in the z/Enterprise Configuration.

Paul R. Robichaux, CEO, co-founder of NewEra Software, Inc. began his career in large systems computing as an operator and programmer of IBM 407s and 402s. He served as the Chief Financial Officer of Boole and Babbage for the ten years immediately preceding his founding of NewEra in 1990. He holds a BS in Accounting and a Masters in Business Administration from a Louisiana State University and is a Certified Public Accountant.

• The corporate mission of NewEra Software is to provide software solutions that help users avoid non-compliance, make corrections when needed and in doing so, continuously improve z/OS integrity.

IODF - the Absolute zControl Point!



Glenn Anderson – MVS Program Keynote - Become more relevant: Map IT resources to the business processes they support.

Presentation Outline

1. Our Mission - (1/4)
   - ✓ What is Compliance?
   - ✓ The Need for Shared Values
   - ✓ Critical Success Factors
   - ✓ System Control Points
   - ✓ Organizational Acceptance
   - ✓ Cost of Implementation
2. IODF - the Absolute zControl Point! - (3/4)
   - ✓ The Basic Elements of the Input/Output Definition File (IODF)
   - ✓ Understanding the Origin of Key System Vulnerabilities
   - ✓ Increasing Audit Interest in using the IODF as a System Control Boundary
   - ✓ How System Complexity is driving the need for New Thinking
   - ✓ The Future of the zEnterprise Configuration Process
   - ✓ How to Build an IODF based Configuration Base – StepOne
3. Health Checker - Hands-on Lab - *Recommended*

   Tuesday, August 9, 2011
   1:30 – 2:30PM
   Asia 2
4. Resources, References and Sessions - *Recommended*

   z/Auditing Essentials - Volume 1
   zEnterprise Hardware - An Introduction for Auditors
   Edited By Julie-Ann Williams - julie@sysprog.co.uk

SHARE in Orlando 2011

Our Mission

Survey Results
& Analysis

for

2011 z/Journal Security Survey

Friday, May 20, 2011

Our Mission

Continuous, Sustainable Improvements in z/OS Availability and Compliance.

Why is this important?

- "The road to complete and sustained z/OS compliance runs through verifiable system integrity."
- "System integrity failures can undermine all business and application controls, rendering them worthless."

Brian Cummings,
TATA Consultancy Services

Our Mission

System Compliance Model – Shared Values:

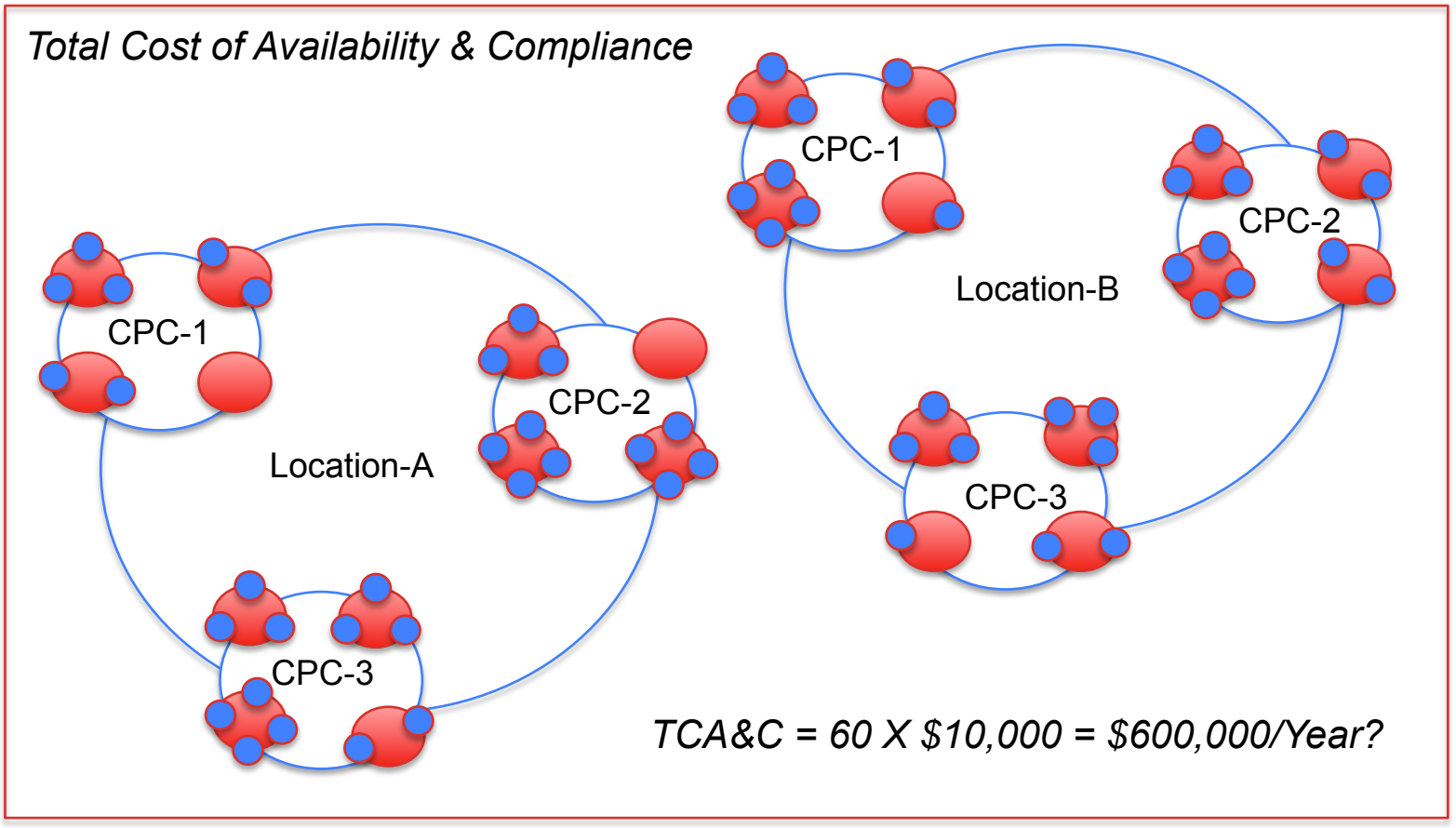
✓ Accept that contemporary Information Systems and the technical professionals that build, maintain and support them must achieve and sustain the highest levels of system integrity.

✓ Recognize that all Information Systems, including those built upon the z/OS operating system must conform to established standards and are subject to independent review for the purpose of compliance verification.

✓ The adoption of a *System Compliance Model* is *The* critical success factor in understanding and improving the effectiveness of the system review process.

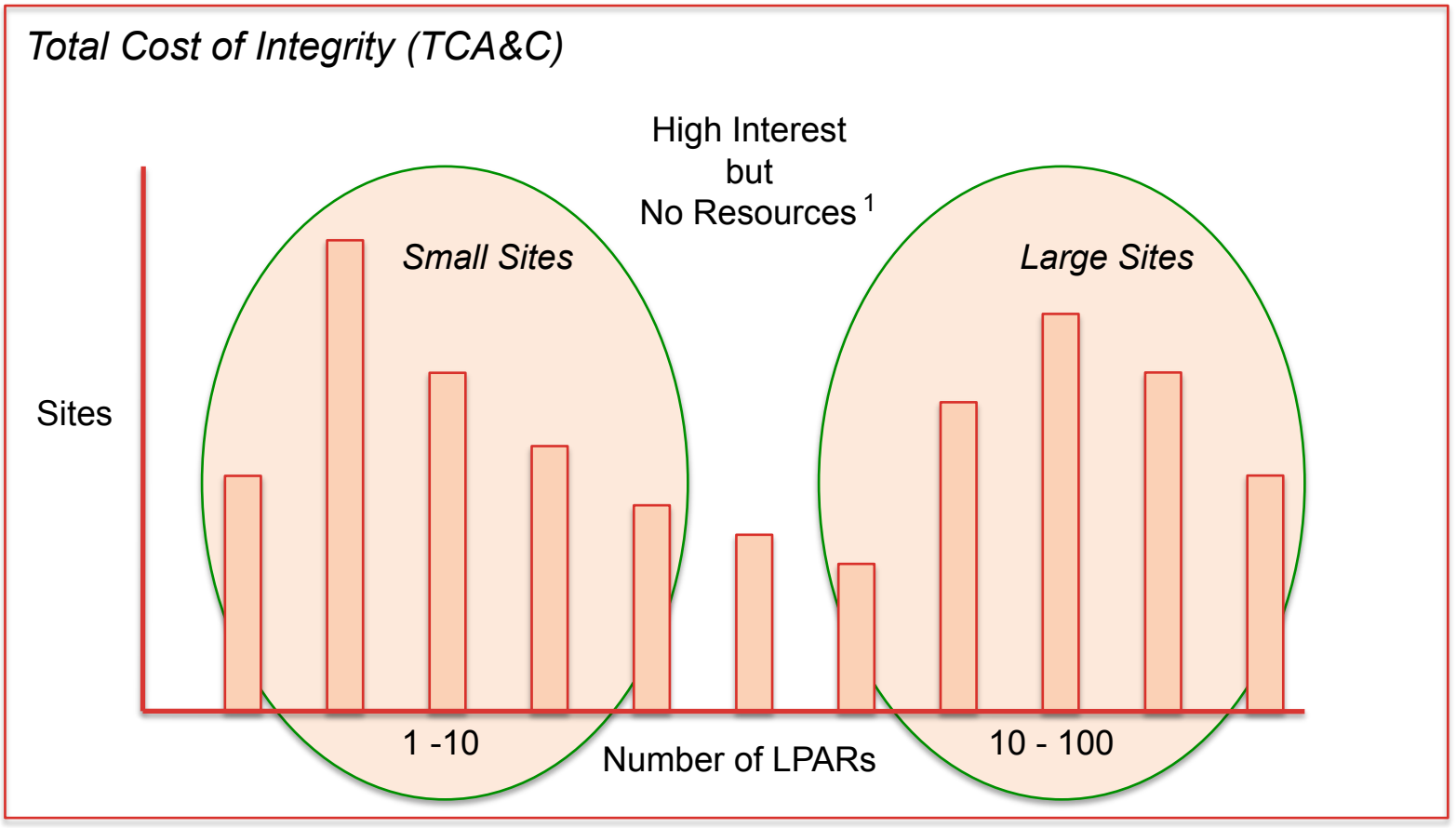
✓ Evangelize the *System Compliance Model to* all *System Stakeholders:* System Users, Management and Compliance Officers as a framework that can efficiently improve, document and demonstrate system compliance.

Our Mission



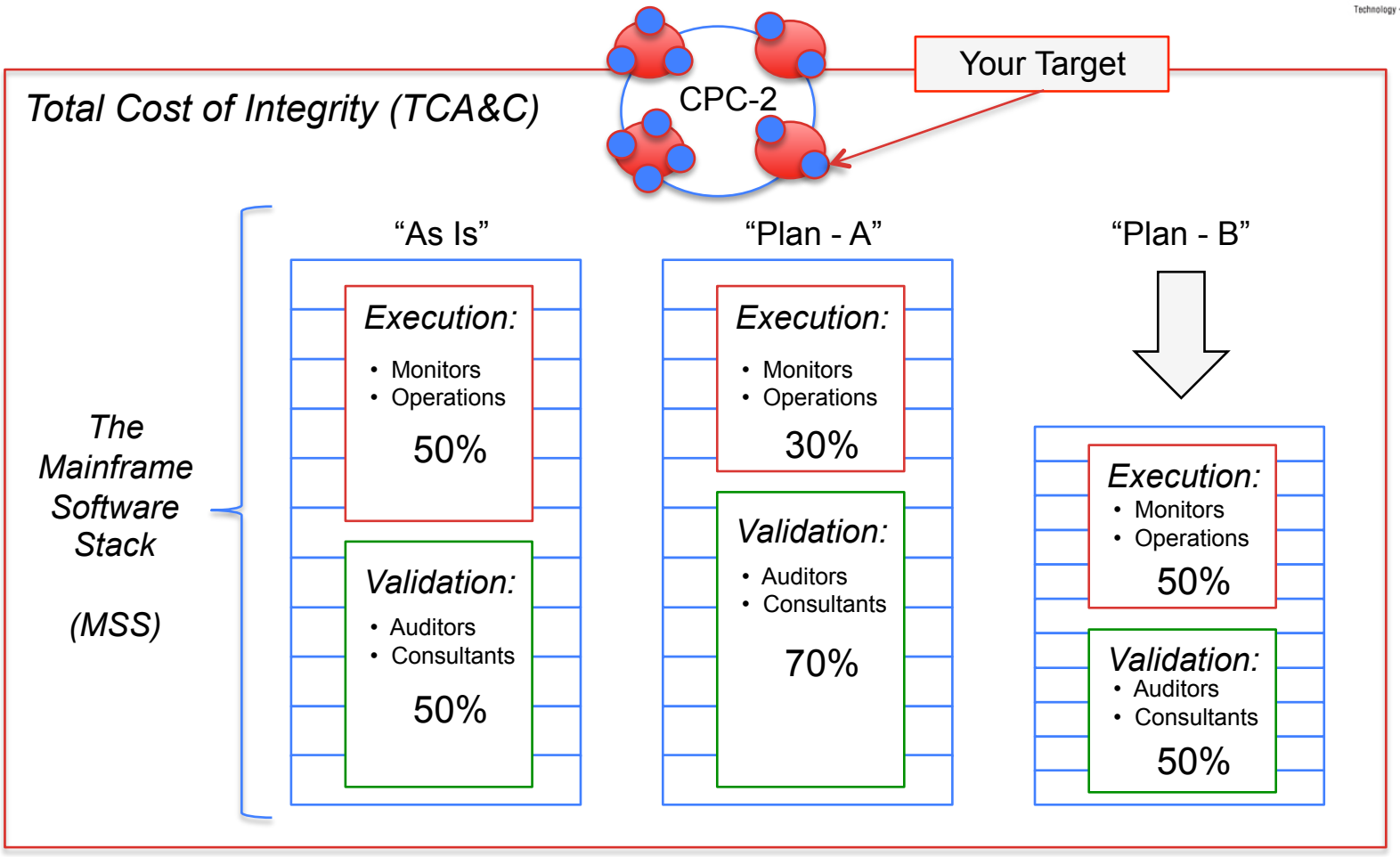
Glenn Anderson – MVS Program Keynote – The zEnterprise: A true Game Changer.

Our Mission



[1] zJournal – zEnterprise Survey – April - May, 2011 – 183 Respondents

Our Mission



Glenn Anderson – MVS Program Keynote – Transition IT from a Cost Center to a Value Center.

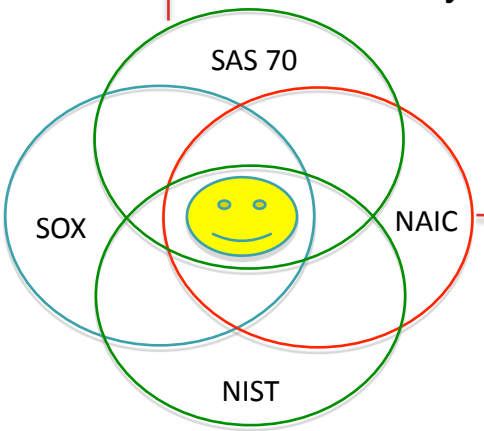
Our Mission

System Compliance Model – What is Compliance?

✓ Compliance - the act of adhering to, and demonstrating adherence to, a standard or regulation.

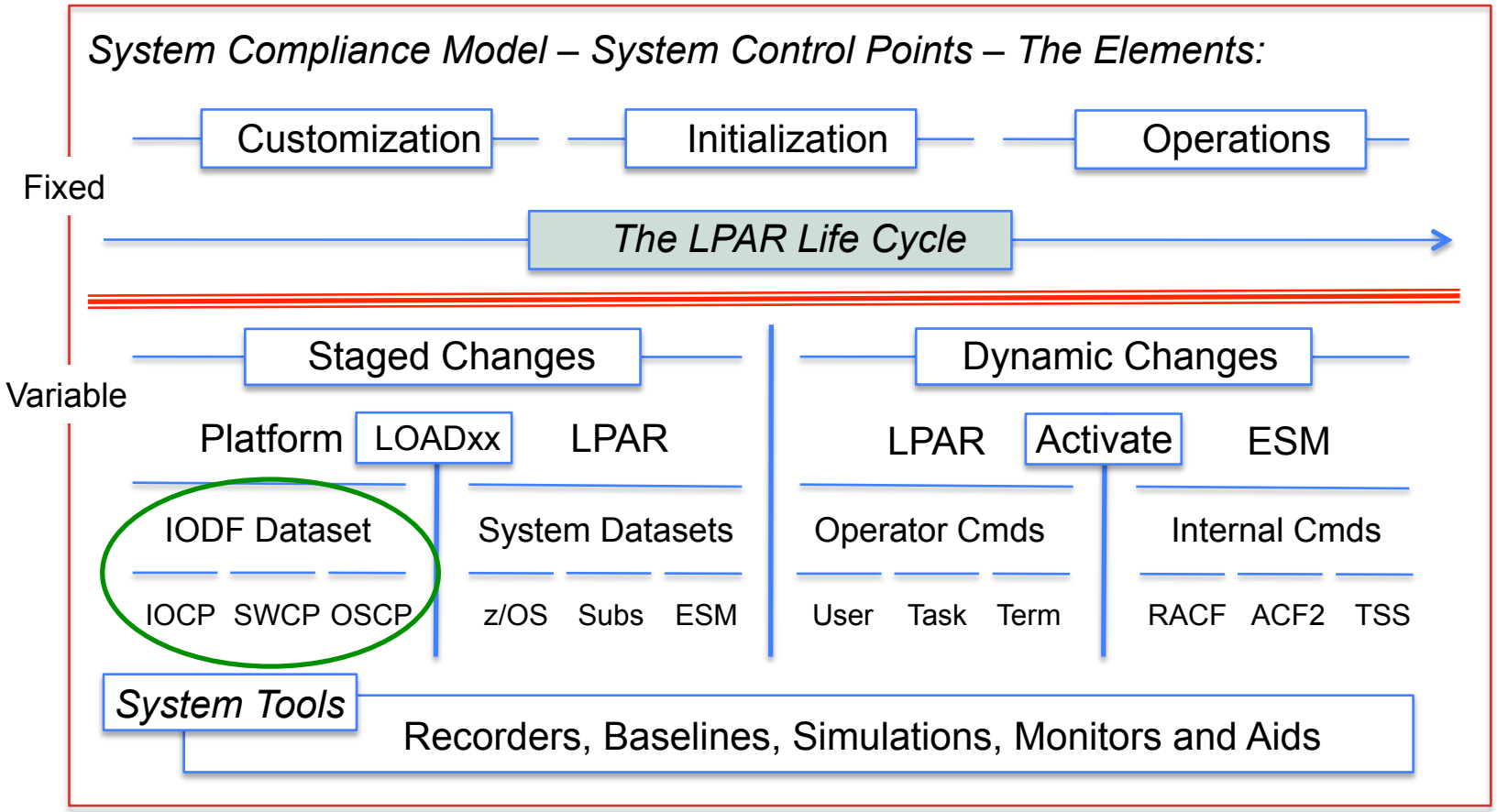
✓ Compliance - describes the goal that corporations or public agencies aspire to in their efforts to ensure that personnel are aware of and take steps to comply with relevant laws and regulations.

✓ Compliance - operational transparency that results in organizations adopting the use of consolidated and harmonized sets of compliance controls in order to ensure that all necessary governance requirements can be met without the unnecessary duplication of effort and activity.



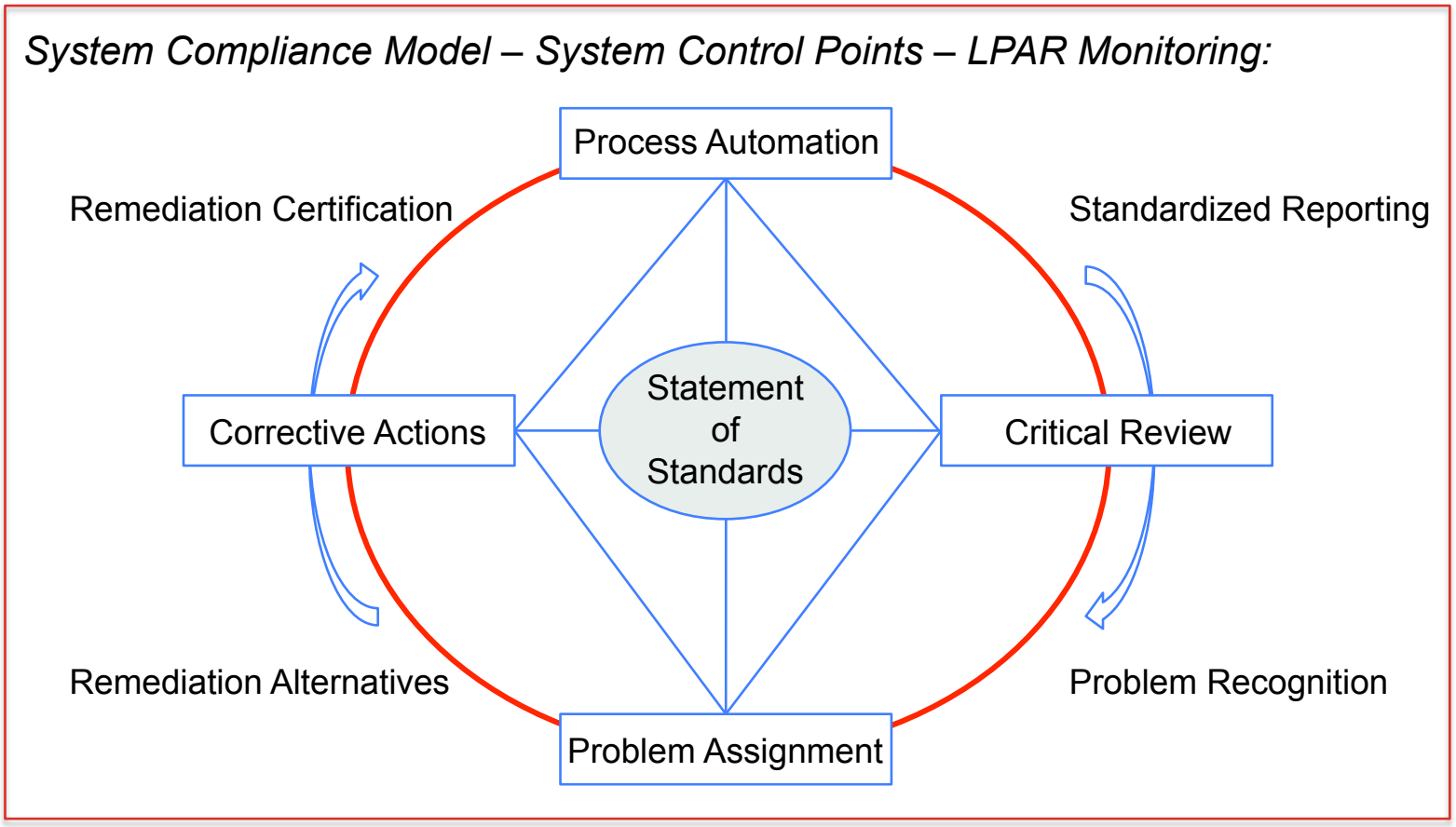
- Common Sense
- Best Practice
- Personal Preference
- Internal Policy
- Industrial
- Governmental

Our Mission



Glenn Anderson – MVS Program Keynote – We we need is an IT Funding Model.

Our Mission

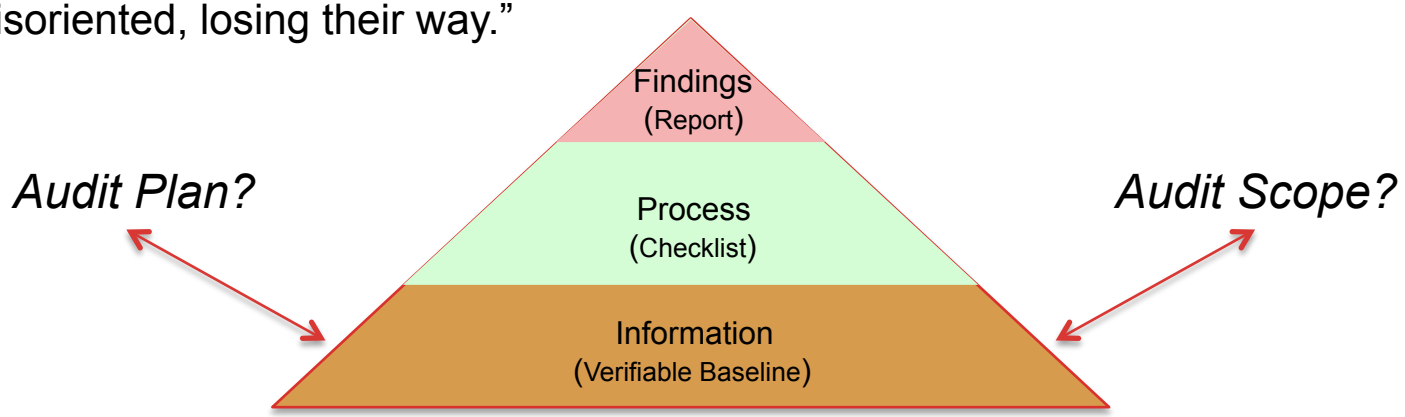

System Compliance Model – System Control Points – LPAR Monitoring:
Process Automation
Remediation Certification
Standardized Reporting
Corrective Actions
Statement of Standards
Critical Review
Remediation Alternatives
Problem Recognition
Problem Assignment

IODF - the Absolute zControl Point!

What's the Problem? Conventional Wisdom!

"…the conventional wisdom of many Audit Plans and Tools ignore the obvious and begin deep in the details of the Operating System (OS) and External Security Manager (ESM).

In doing so, these Plans and Tools often fail to establish an independently verifiable System Baseline. Without such a repository of system identity and configuration relationships, zEnterprise System Auditors can become disoriented, losing their way."



IODF - the Absolute zControl Point!

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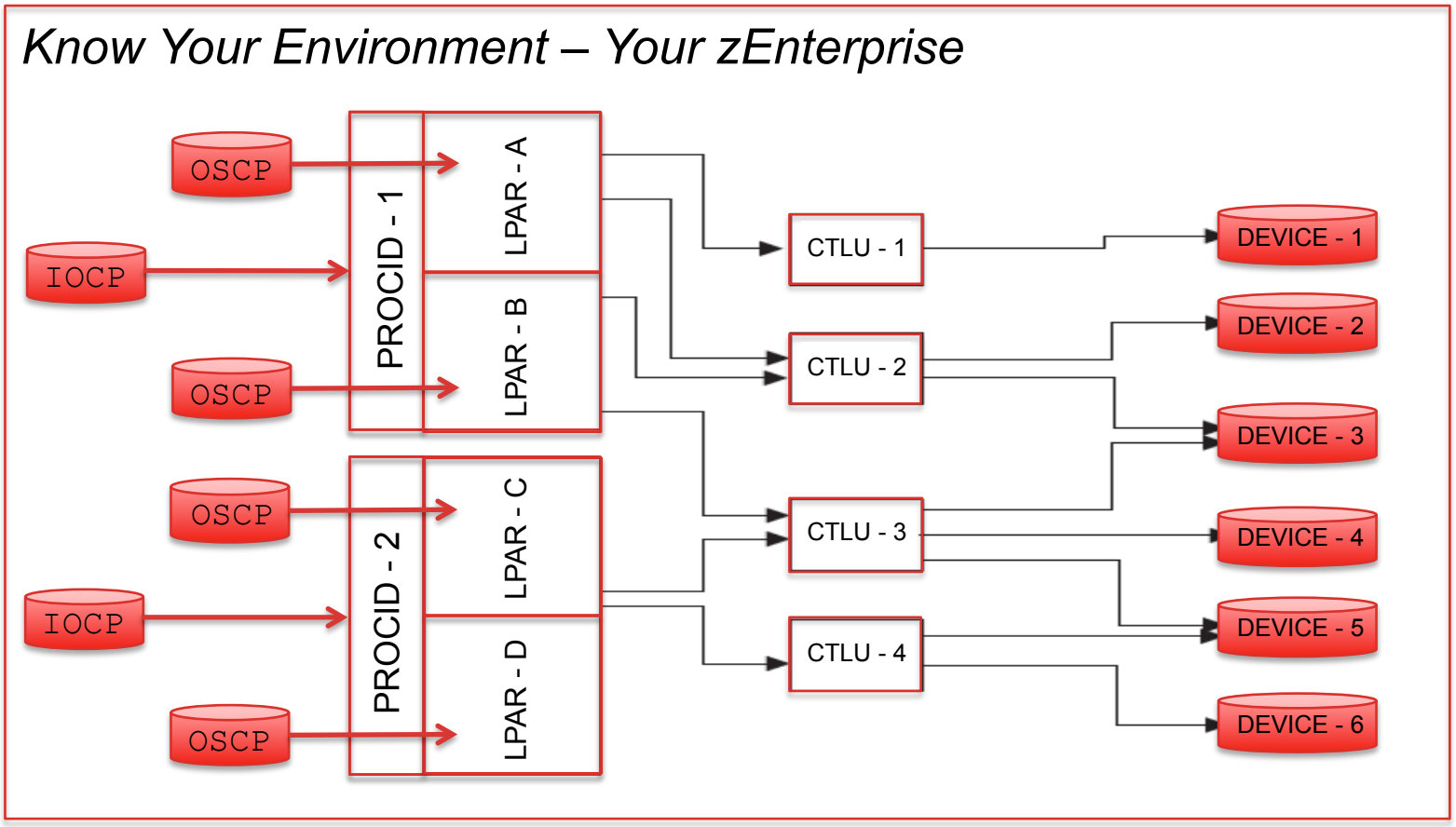
What is the IODF? Why is it Important? Who is Responsible?

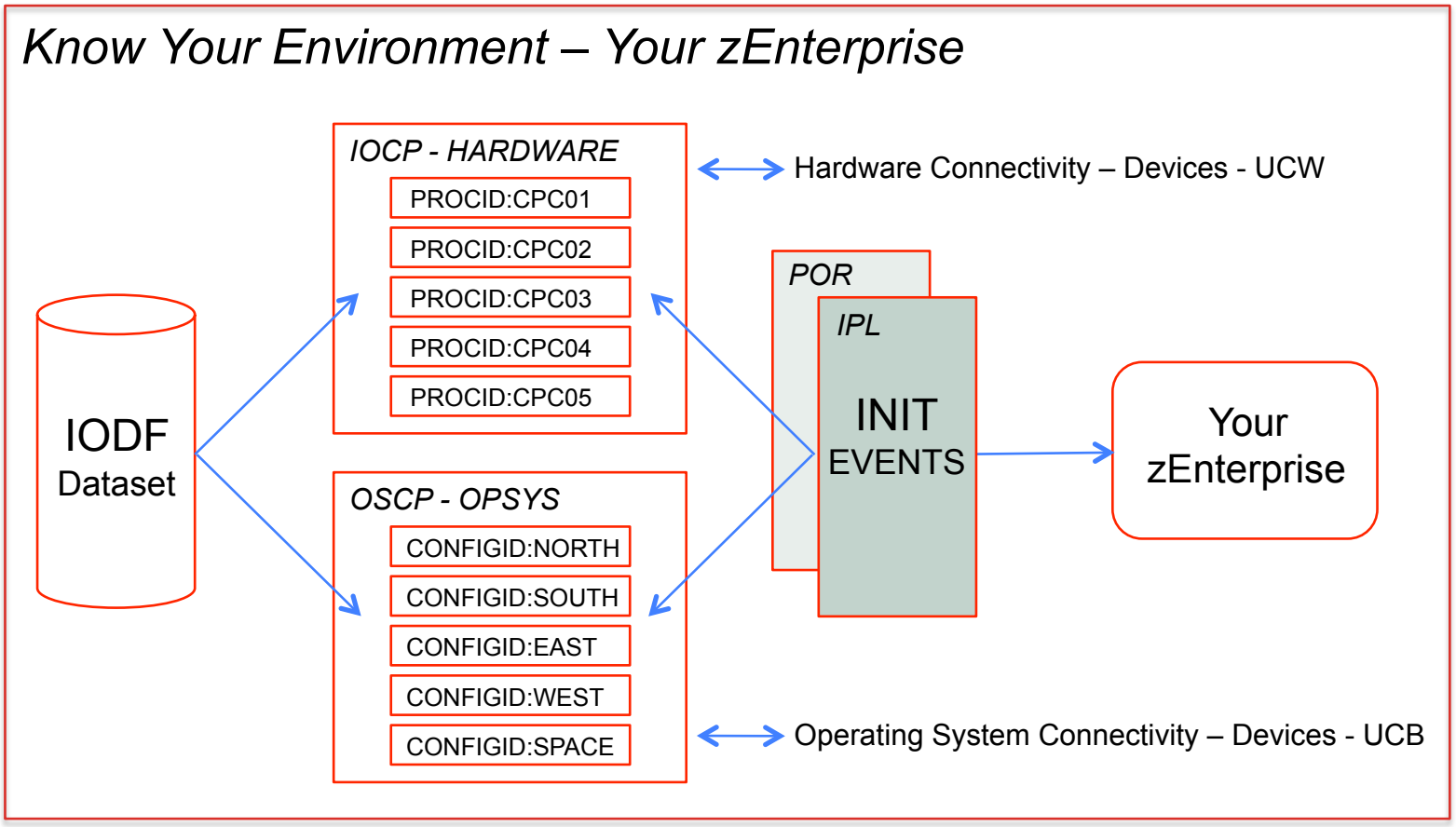
- ☑ The Input/Output Definition File (IODF) is the set of configuration statements that define a network of z/Platform resources. These resources are generally available to both the z/OS operating system (OSCP) and the z/Platform hardware (IOCP) and any related ESCON/ FICON Directors (SWCP).
- ☑ Because of its vital role in shaping the environment, the IODF should be viewed as a major Control Point of high informational value in maintaining the accuracy, integrity and security of the z/OS Operating System and its associated z/Platform hardware (The Mainframe).
- ☑ The process of shaping the z/Series platform into a unique computing configuration, meeting business requirements, is the role of Hardware Planners, skilled technicians, that use IBM's HCD and/or HCM to create and maintain one or more IODF Datasets.

IODF - the Absolute zControl Point!



IOCP – Input/Output Control Program
IOCDS – Input/Output Control Dataset
MVSCP – MVS Control Program
PROCID – Processor Identification
LPAR – A Logical Partition
CTLU – Control Unit

IODF - the Absolute zControl Point!



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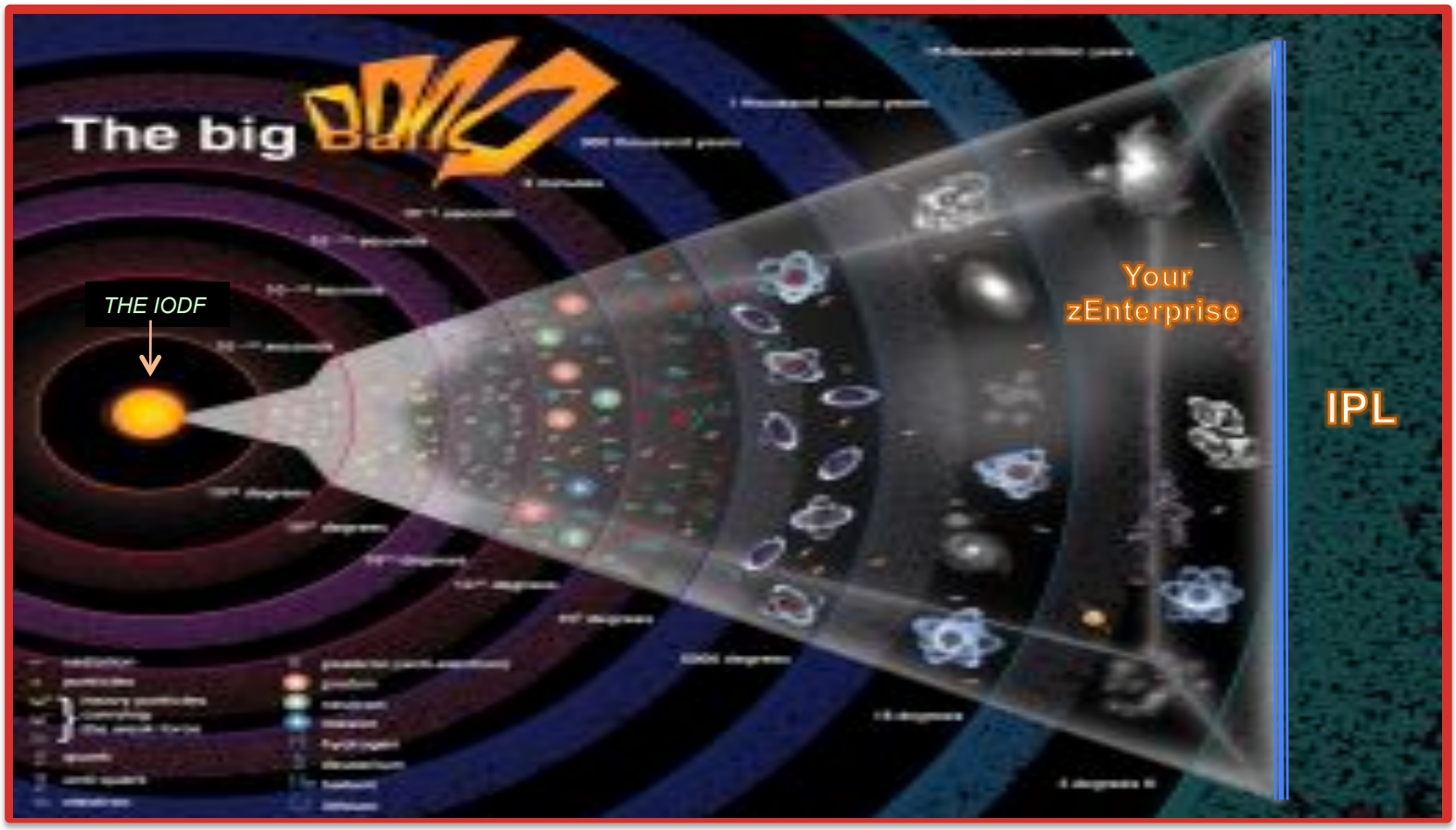


IODF - the Absolute zControl Point!

zEnterprise Management – How OSCP works with LOADxx

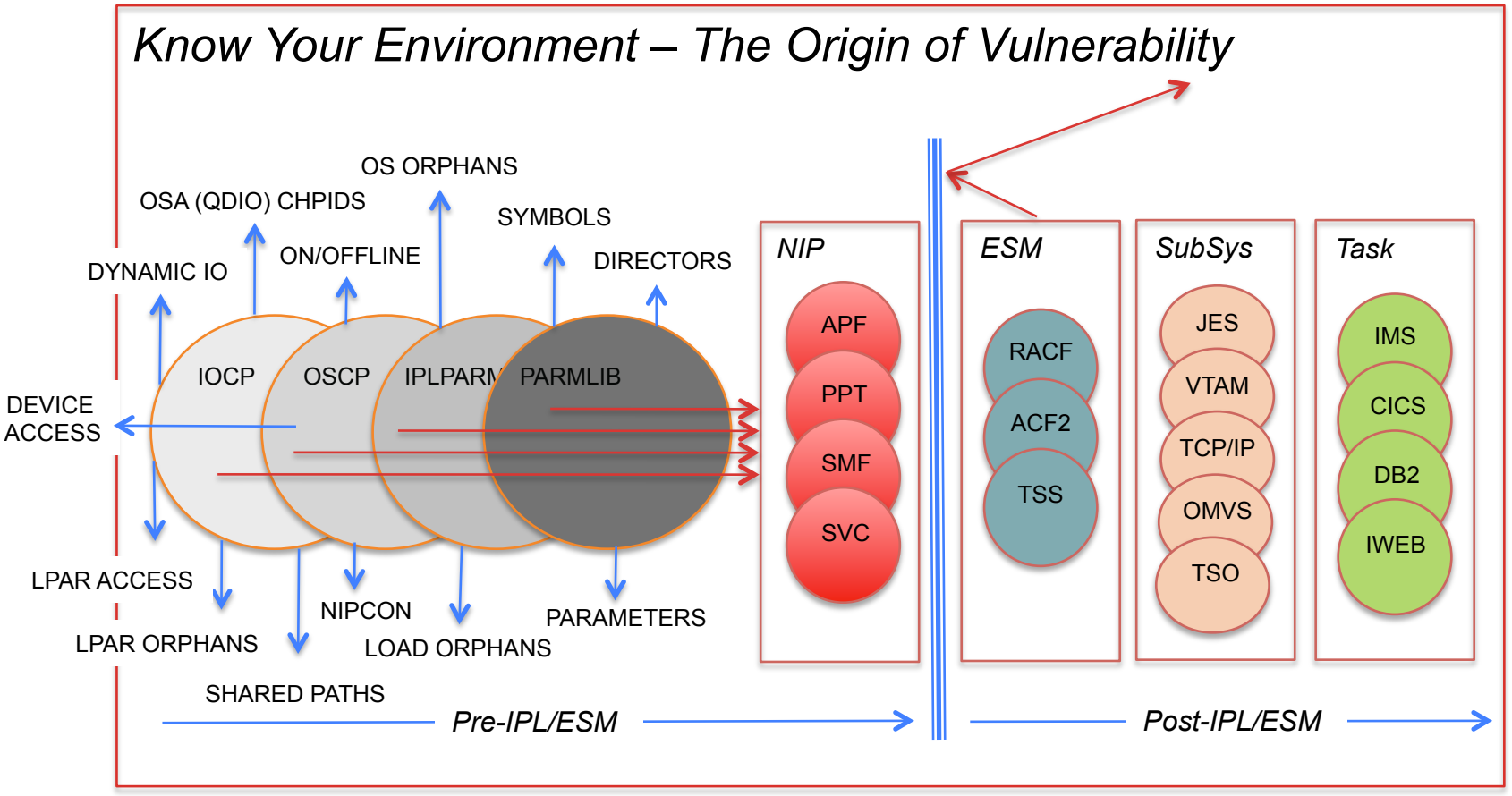
```
*---+----1----+----2----+----3----+----4----+----5----+----6----+----7
ARCHLVL  a
DYNCPAAD {ENABLE | DISABLE}
IEASYM  [xx]
        [(xx,yy,zz,...,L)]
INITSQA  xxxxK yyyyK
         xxxxM yyyyM
IODF     xx hiqualif configid id y s
NUCLEUS  n
NUCLST   nn  y
PARMLIB  dsn                                          [volid]
                                                      [******]
                                                      [*MCAT*]
SCHSET   n
SYSCAT   volserxycsdsname                                    hlqtvc
SYSPARM [xx]
        [(xx,yy,zz,...,L)]
SYSPLEX  plexname
```

New in V1R12

01-04 - IODF Keyword
10-11 - IODF Dataset Suffix, if “01” then Dataset name would be IODF01
13-21 - IODF Dataset High Level Qualifier, if “SYS!” then fully qualified name would be SYS1.IODF01
22-29 - OS configuration identifier used to select a named OSCP configuration from the IODF Dataset
31-32 - The Eligible Device Table associated with a named OSCP configuration
34-34 - “Y” to load all IODF defined devices and any other dynamically available devices
36-36 - “S” the subchannel set to be used during an IPL – Specify 0 or 1

```
Special rules apply when: IODF Suffix is specified as "++, --, **, =="
                          IODF HLQ is specified as "========"
If the OS ConfigId not found system enters a wait state
```

IODF - the Absolute zControl Point!



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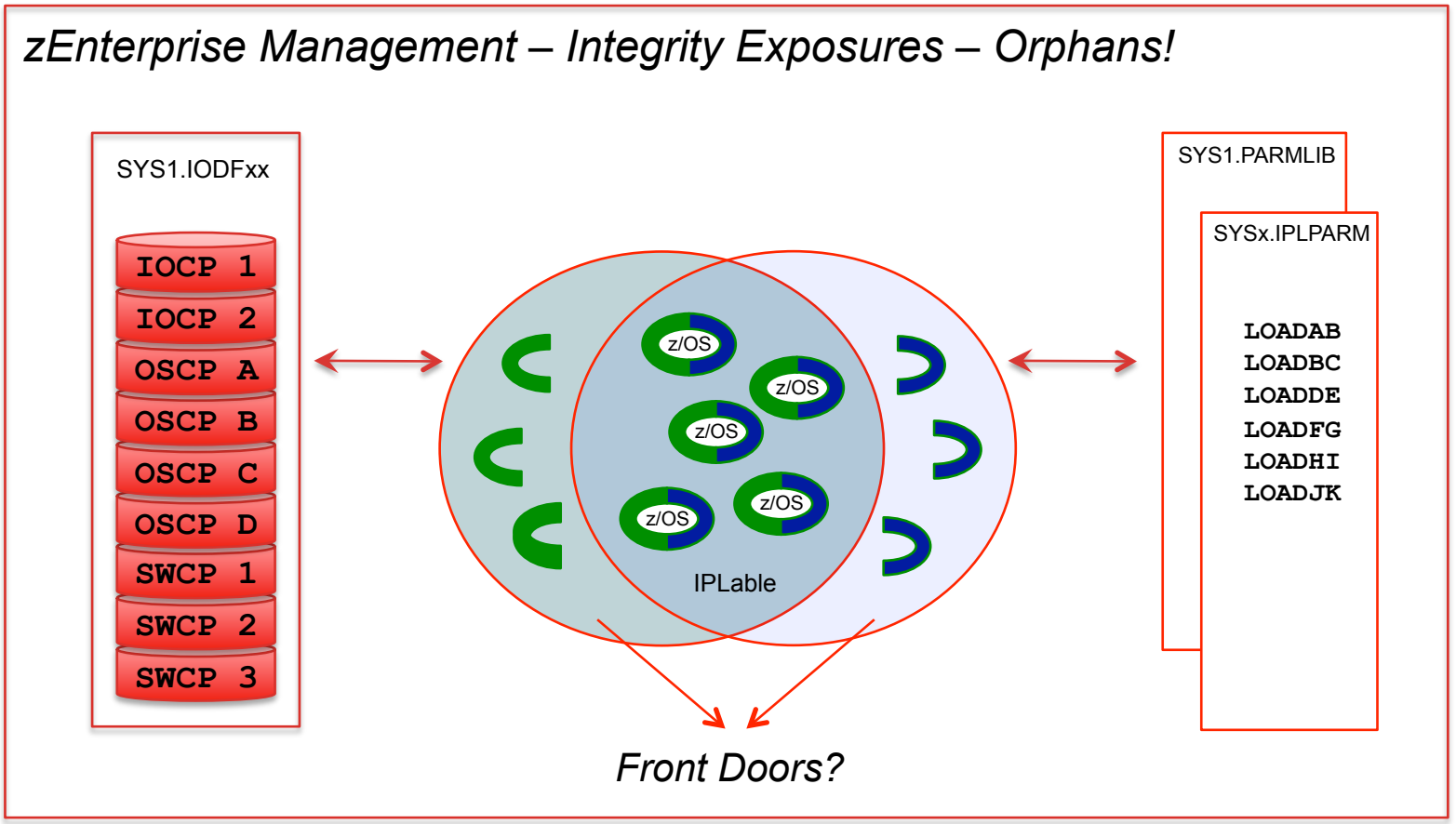
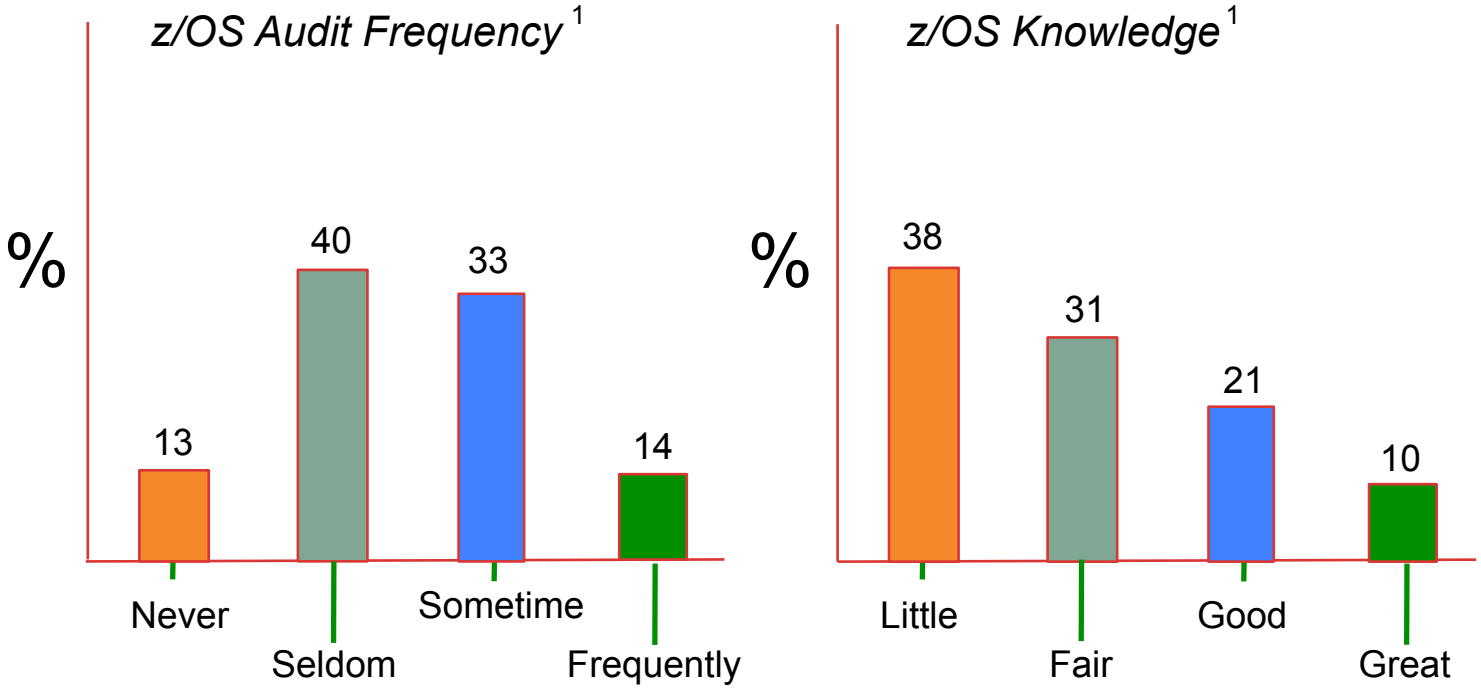


z/OS - IPLable – OSCP CONFIGID matching those defined in LOADxx Member

- Orphaned OSCP CONFIGID - Orphaned LOADxx Members

IODF - the Absolute zControl Point!

Who are these Guys? Active Enough, Smart Enough!



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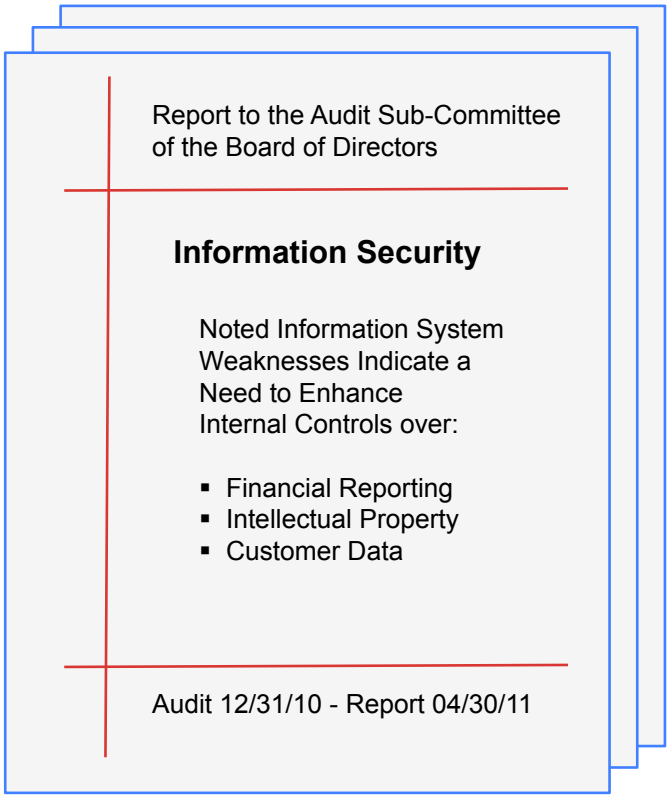
IODF - the Absolute zControl Point!

What Bad News Look Like!

"...Although progress has been made in correcting previously reported Information Security weaknesses, system control material weaknesses[1] continue to jeopardize the confidentiality, integrity and availability of those formal processes intended to safeguard access to financial, intellectual property and customer data.."

[1] "…A material weakness is a deficiency, or a combination of deficiencies, in internal controls such that there is a reasonable possibility that material misstatement may result…"



IODF - the Absolute zControl Point!

The Top Ten Check List - Post-IPL/ESM – 1 of 10

☑ Is IODF a Recognized Control Boundary?

It has been noted recently that mismanagement of the IODF Dataset may lead to the very risky sharing of devices with completely different security requirements.

Unfortunately many installations will not acknowledge using the IODF as a boundary control and are now being blistered for their stance and being pressured to view this scenario differently.

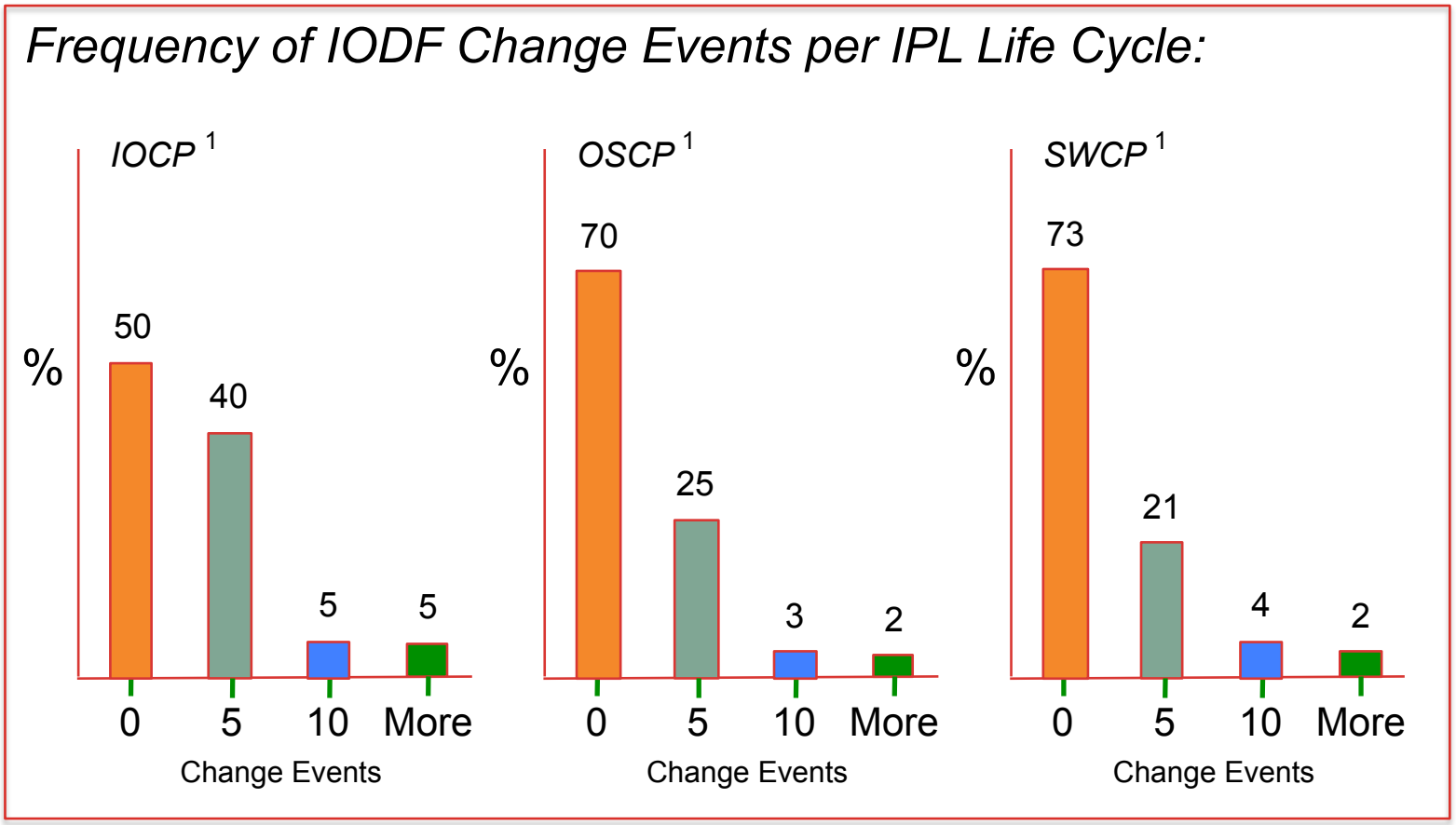
An example: hardware staff accidentally connected an entire bank of Production DASD to a newly authorized Test LPAR via configuration cloning and in doing so neglected to update the LPAR and DEVICE Access and/or Candidate List to limit CROSS-LPAR Device access.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Best Practices!

- ☑ Establish Limits:
  - Access to HCD/HCM
  - NONE/READ/UPDATE Authority to SYS1.IODFxx
  - Access to the Hardware Management Console (HCM)
  - Access to the System Element (SE)
  - Access to the Management Network (URM)
  - Access to LOADxx Members – SYSn.IPLPARM
  - Access to System Parameters – SYS1.PARMLIB
  - Access to NIPS and System Consoles
  - Require “Activity Logging” ON
- ☑ Document and Periodically Review Initialization Process:
  - Power On Reset (POR)
  - Initial z/OS Program Load (IPL)
  - Disaster Recovery/Business Continuity

IODF - the Absolute zControl Point!



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IODF - the Absolute zControl Point!

zEnterprise Management – About HCD/HCM – Transparency?

☑ The z/Platform is a highly adaptable general-purpose computer that can be "shaped" into many different forms, formats and configurations to meet varying needs. Some will use the platform exclusively for the z/OS operating system. Others will split the platform between z/OS and z/VM or z/Linux (a form of UNIX). The process of shaping the z/Series platform into a unique computing configuration that will meet business requirements is the role of the z/Hardware Planner.

☑ In doing their jobs, these skilled technicians use IBM's HCD and/or HCM to create and maintain one or more IODF Datasets, each containing one or more unique hardware and/or software configurations. While powerful and required for their intended purpose, HCD and HCM do not provide the content transparency demanded by the "*System Compliance Model*".

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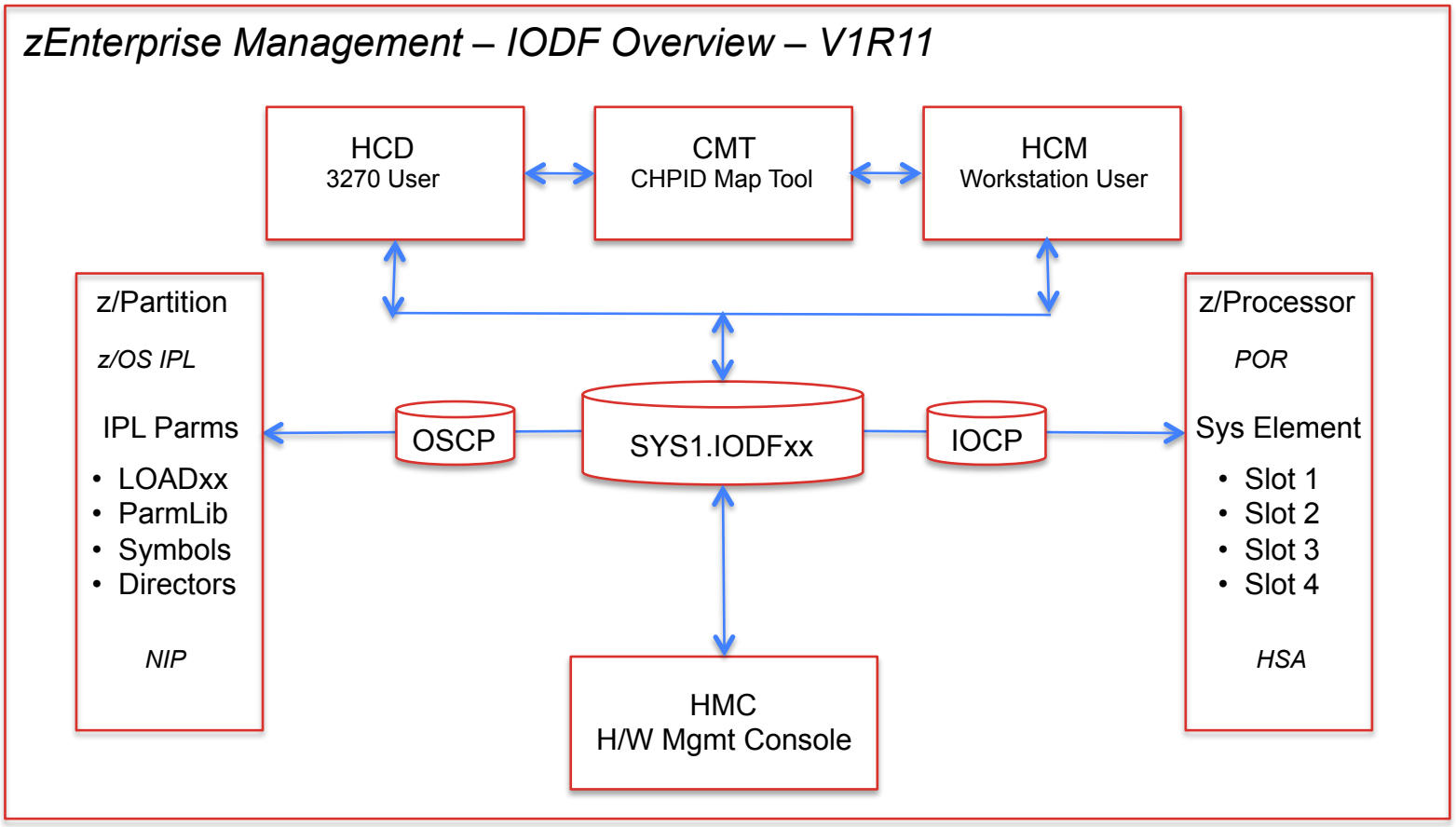

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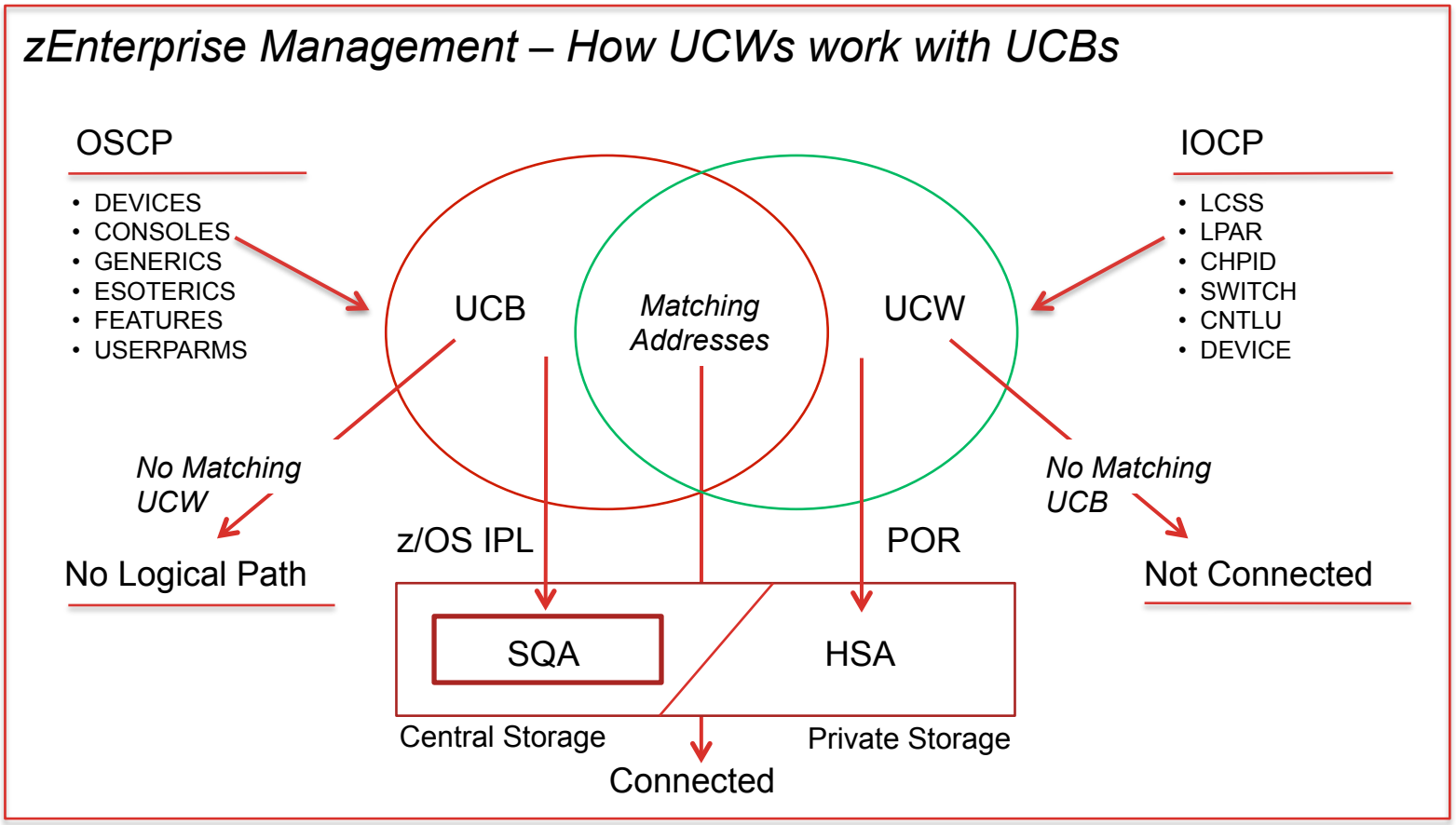
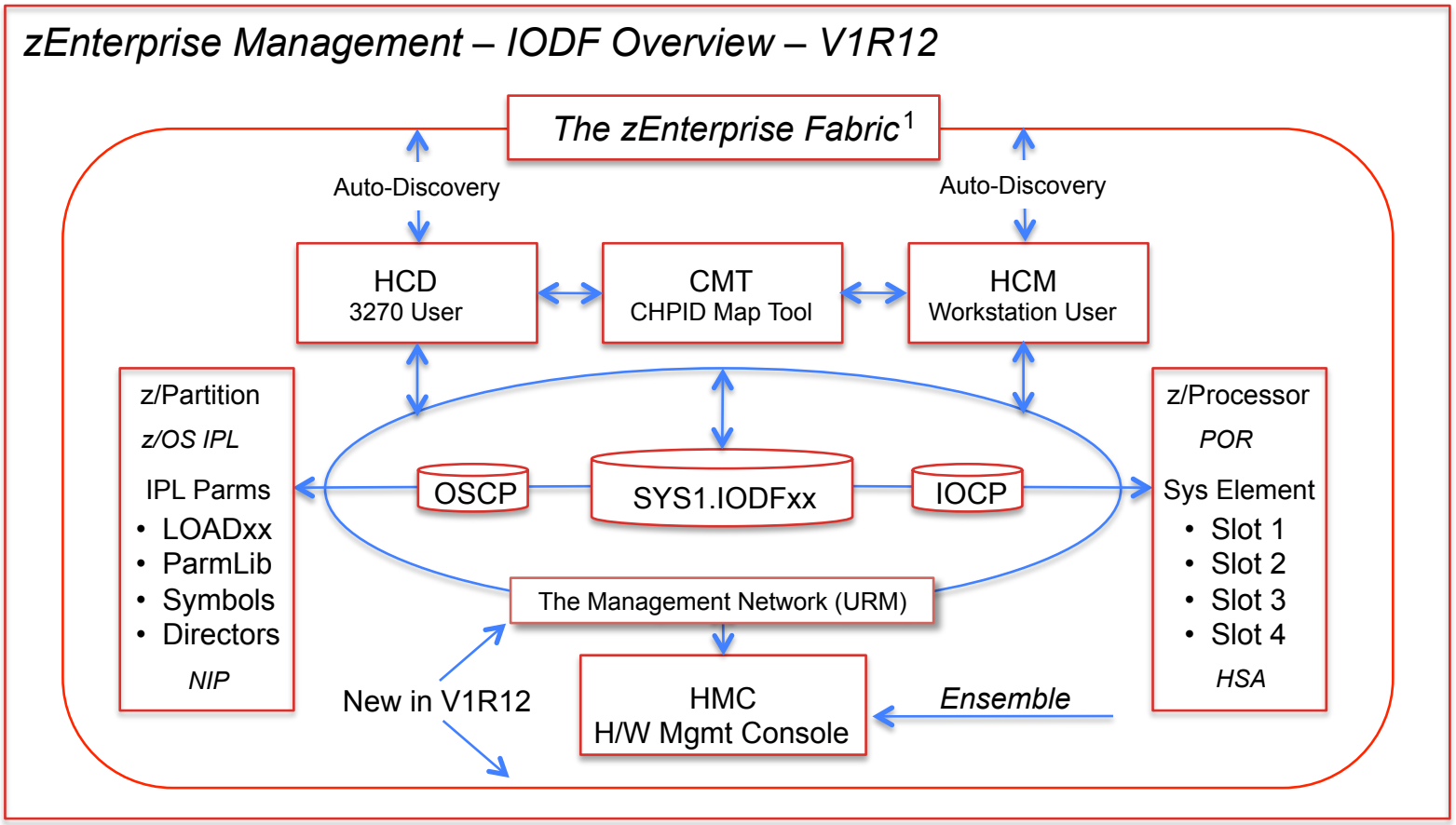


UCB – Unit Control Block
UCW – Unit Control Work
SQA – System Queue Area
HSA – Hardware Storage Area

IODF - the Absolute zControl Point!



[1] The zEnterprise Fabric extends to the edge of the available zInformation System Data Horizon.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R12 – Auto Discovery

- ☑ HCD can invoke the Input/Output Subsystem (IOS) to discover I/O hardware in the current configuration that is accessible to the system. Controllers, Control Units and Devices which are currently not yet defined in either the active or currently accessed IODF can be automatically configured.
- ☑ HCD Auto Configuration presents the discovered Controllers, Control Units and Devices to the user and offers proposals how to configure them. The user can accept or change these definition proposals. On the user's confirmation, the configuration definitions are written to the specified target IODF.
- ☑ HCD Auto Configuration is available only with the zEnterprise 2817 processors.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R12 – Auto Discovery

- Auto Configuration – *Policy*
  - Auto Configuration Policies defined as a set of keyword values control the automatic discovery of control units and devices and how they will be attributed to defined Logical Partitions and OS Configuration Groups.
- Auto Configuration – *Groupings*
  - Logical Partition Groups – LP Group is a set of LPARs in the same sysplex used by Auto Configuration to determine which discovered devices will be assigned to which LPARs.
  - OS Configuration Groups – OS group is a set of OS configurations used by Auto Configuration to determine which discovered devices will be assigned to which MVS.
- Auto Configuration - *Proposals*
  - Proposed Devices - A listing of proposed Device definition details for existing or new devices accessible by the currently processed discovered control units.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R12 – Auto Discovery

- Single Point of Failure[1]
  - A given configuration set is considered better than any other set when it contains a fewer number of single failures that can affect device connectivity.
- Spreading the work[1]
  - A given configuration set is considered better that any alternative set when it user fewer common components.
- Contention Reduction[1]
  - A given configuration set is considered better than any alternative configuration set if it satisfies the “Spread Rule” and uses fewer components that are already in use by previous configurations.

[1] The Math: A Djikstra’s Algorithm that computes the optimization heuristically

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R13 – HCD/HCM

- ☑ Special Secondary Device Validation

  When building a production IODF, HCD checks for each OS configuration of type MVS with a connected 3390D device, that a 3390B device with the same device number is also connected to this OS configuration.

- ☑ LSYSTEM and CSYSTEM Validation

  The source and target CHPIDs of a CIB coupling connection are each given the local system name of the processor to which they will connect. Therefore, HCD make users aware of the consequences whenever local system name changes.

- ☑ Auto invocation of IODF Checker

  HCD now also invokes the IODF checker whenever a general validation of completeness and consistency of the IODF is performed, for example, building a production IODF or a validated work IODF. If the checker detects a defect, HCD informs the user by issuing a severe warning message.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R13 – HCD/HCM

- Subchannel Set ID Mismatch

  A device subchannel set ID that is used in a device-to-processor definition but not used in any device-to-OS definition for the device is now flagged by HCD prior to the building a production IODF.

- CIB (InfiniBand) CHPID Host Configuration Adapter

  HCD issues the new warning message when more than four CIB CHPIDs are defined on the same AID (Host Configuration Adapter ID) port.

- Working with CPC (Central Processing Complex) Images

  HCD provides a new function called ***Work with CPC images*** which you can launch from a selected CPC in the S/390 Microprocessor Cluster List. Use this function to view the operation status and attributes of each defined logical partition for the selected CPC.

IODF - the Absolute zControl Point!

zEnterprise Management – IODF Overview – V1R13 – Health Checker for z/OS

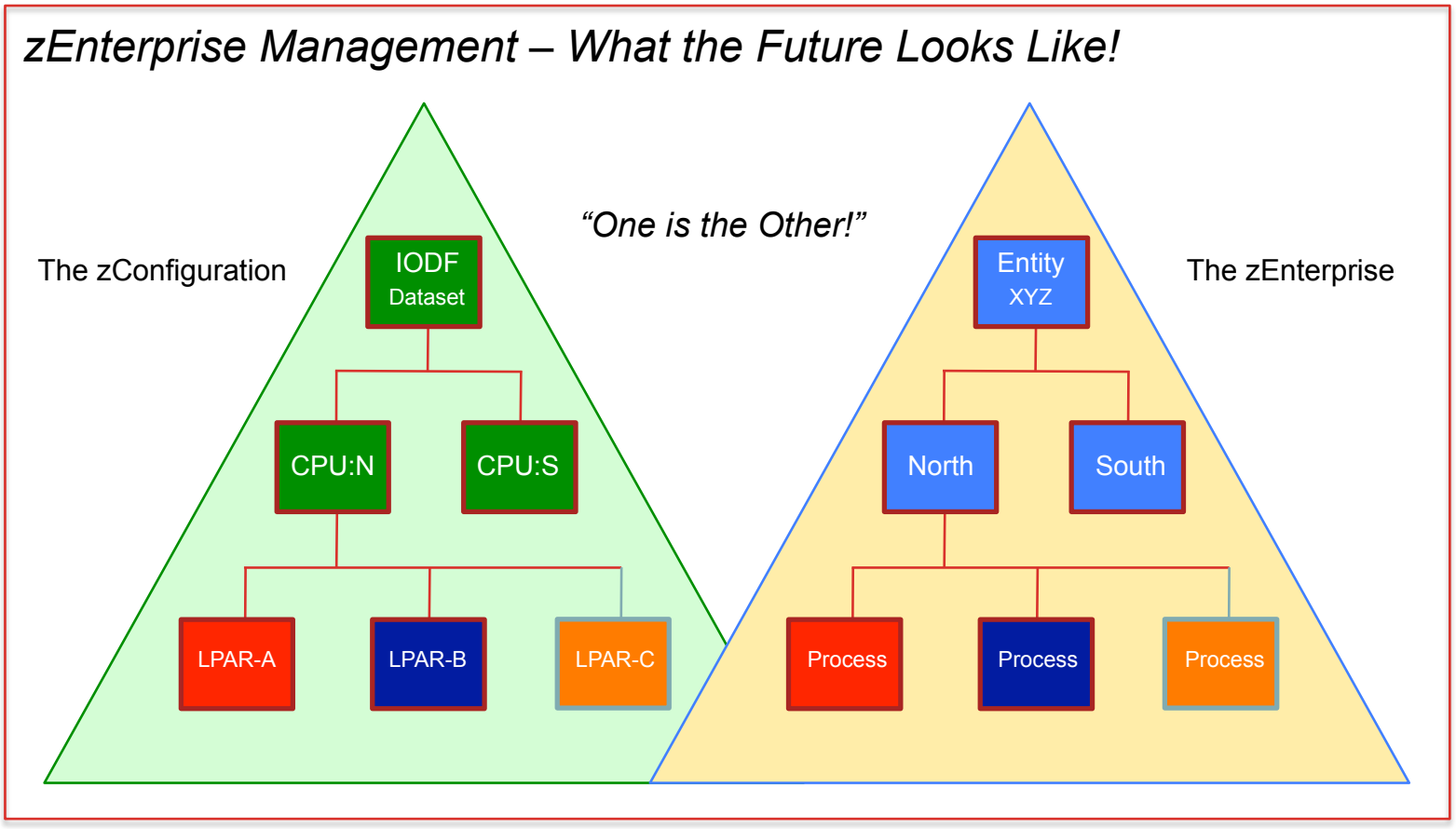
- Device Manager checks (IBMDMO)
  DMO_TAPE_LIBRARY_INIT_ERRORS

  Description/Reason for check:
  This check reports any tape library initialization errors that were detected during IPL. This is a local check, which will run once per the life of the IPL. Ensures that tape library HCD definitions agree with the tape library hardware definitions.

- IOS checks (IBMIOS)
  IOS_CMRTIME_MONITOR

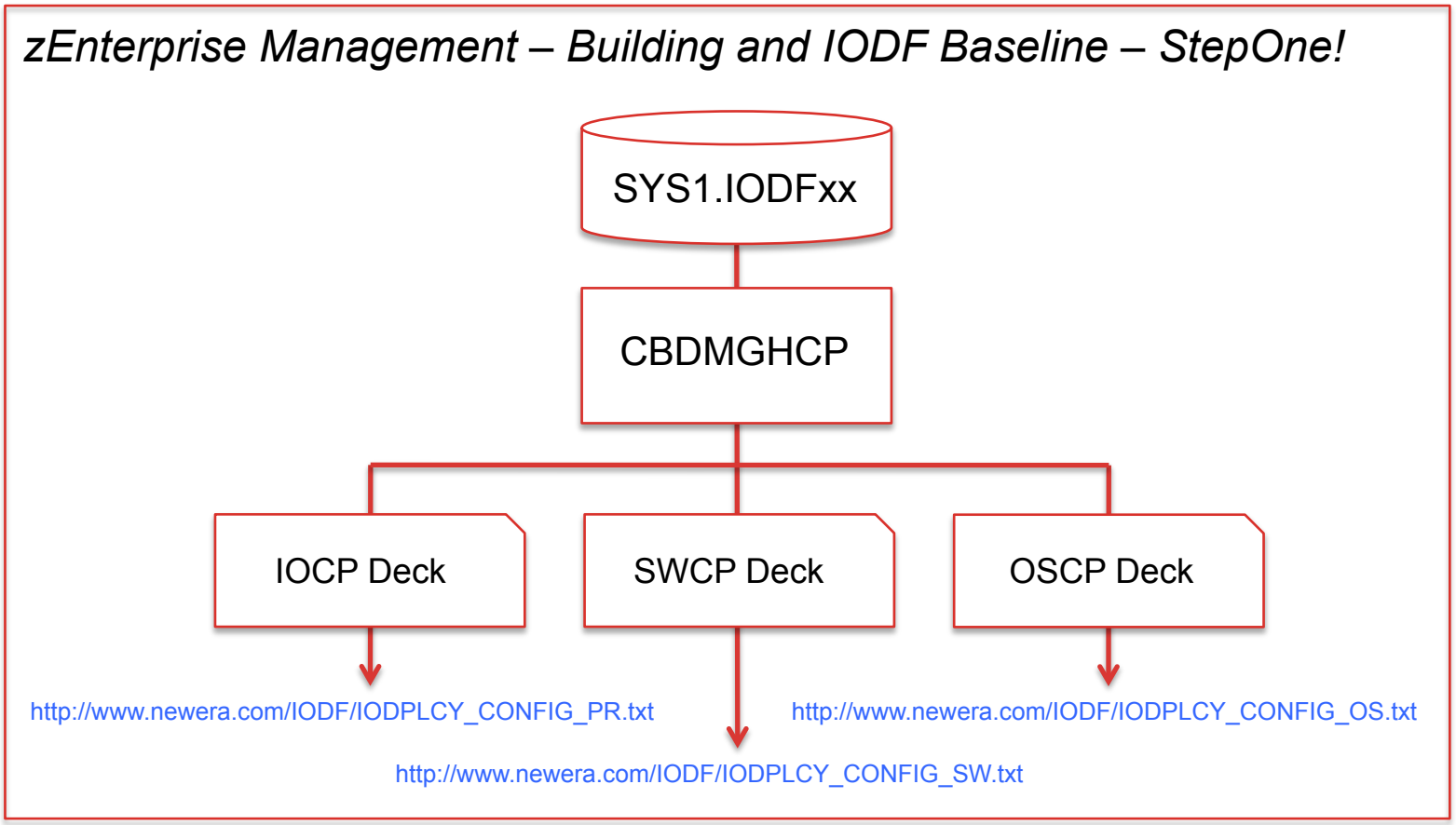
  Description/Reason for check:
  Detects if any control units in the system are reporting inconsistent average initial command response (CMR) time for their attached channel paths.
  Initial Command Response (CMR) time is a component of Response time and measures the round trip delay of the fabric alone with minimal channel and control unit involvement and thus can be a symptom of potential problems in the fabric: Hardware Error, Misconfiguration and Congestion.

IODF - the Absolute zControl Point!



Glenn Anderson – MVS Program Keynote - Become more relevant: Map IT resources to the business processes they support.

IODF - the Absolute zControl Point!



Deck - Named set of Configuration Control Statements in Card Image format

IODF - the Absolute zControl Point!

zEnterprise Management – Building and IOCP Baseline – StepOne!

```
                TITLE 'SYS1.IODFxx - 2013-01-01 00:00:00'

ID NAME=CDC1CFx,UNIT=2097,MODEL=E26,                                  *
      DESC='Coupling Facility 1 CDC1',SERIAL=02DBE22097,              *
      MODE=LPAR,LEVEL=H080131,LSYSTEM=ONE9330D,                       *
      SNAADDR=(IBM390PS,ONECF1),                                      *
      SCR='CDC1CF1   . .M..p........        09-05-0113:30:05SYS*
      2     IODF4C   '
RESOURCE PARTITION=((CSS(0),(SYS1,4),(SYS2,F),(SYS3,6),(SYS4,2*
      ),(*,1),(*,3),(*,5),(*,7),(*,8),(*,9),(*,A),(*,B),(*,C),*
      (*,D),(*,E))),MAXDEV=((CSS(0),65280,65535)),                    *
      CSSDESCL=('CFB1 CFCP1 CFNZ1',                                   *
      DESCL=('SBPLEX PRODUCTION CF LPAR','Test LPAR CFB1B','TS*
      YS PRODUCTION CF LPAR','CMCY PRODUCTION CF LPAR'),              *
      USAGE=(CF,CF,CF,CF,CF/OS,CF/OS,CF/OS,CF/OS,CF/OS,CF/OS,C*
      F/OS,CF/OS,CF/OS,CF/OS,CF/OS)

CHPID PATH=(CSS(0,2),05),SHARED,                                      *
      PARTITION=((SYS1,SYS2,SYSC,SYSD),(=) ,REC)),SWITCH=12,          *
      SWPORT=((12,24)),DESC='DMX3 2500',PCHID=322,  TYPE=FC           *
```

IODF - the Absolute zControl Point!

zEnterprise Management – Building and OSCP Baseline – StepOne!

```
                TITLE 'SYS1.IODFxx - 2013-01-01 00:00:00

IOCONFIG ID=00,NAME=PROD01,TYPE=MVS,DESC='PROD01_NEWPLEX'

IODEVICE ADDRESS=(0A70,6),UNIT=3270,MODEL=X,FEATURE=DOCHAR,    *
      OFFLINE=NO,DYNAMIC=YES,LOCANY=NO,CUNUMBR=0A70
IODEVICE ADDRESS=(0600,16),UNIT=3480,                          *
      FEATURE=(SHARABLE,COMPACT),OFFLINE=YES,DYNAMIC=YES,      *
      LOCANY=YES,                                              *
      USERPRM=((LIBRARY,NO),(AUTOSWITCH,NO),(MTL,NO)),         *
      CUNUMBR=0603
UNITNAME NAME=CART,                                            *
      UNIT=((1C00,16),(1C10,16),(1C20,16),(1C30,16),(1C40,16),*
      (1C50,16),(1C60,16),(1C70,16),(1C80,16),(1C90,16),(1CA0,*
      16),(1CB0,16),(1CC0,16),(1CD0,16),(1CE0,16),(1CF0,16))

NIPCON DEVNUM=(0160,0170,0110,0171,0111,0100,0101)             *
```

DYNAMIC - Specifies if the device is eligible for dynamic I/O configuration
USERPRM - Specifies DEVICE specific OS private parameters
OFFLINE - Specifies that a DEVICE ON|OFF line at IPL time

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zEnterprise Management – Building and SWCP Baseline – StepOne!

```
                TITLE 'SYS1.IODFxx - 2013-01-01 00:00:00  '
*
  SWITCH SWID=01,ADDRESS=21,DESC='ABC Director ATM Remote',      *
        PORT=((00,7F),(FE,FE)),UNIT=2032
  PORT ID=02,OCC
  PORT ID=03,OCC
  PORT ID=12,OCC
  PORT ID=13,OCC
  PORT ID=22,OCC
  PORT ID=23,OCC
  PORT ID=31,OCC
  PORT ID=32,OCC

  SWITCH SWID=02,ADDRESS=22,DESC='ABC Director ATM Remote',      *
        PORT=((00,7F),(FE,FE)),UNIT=2032
  PORT ID=02,OCC
  PORT ID=03,OCC
  PORT ID=12,OCC
  PORT ID=13,OCC
```

Port Matrix

The SWCP Configuration for a Named PROCID is also embedded in its IOCP

OCC - Indicates that a port has an external connection

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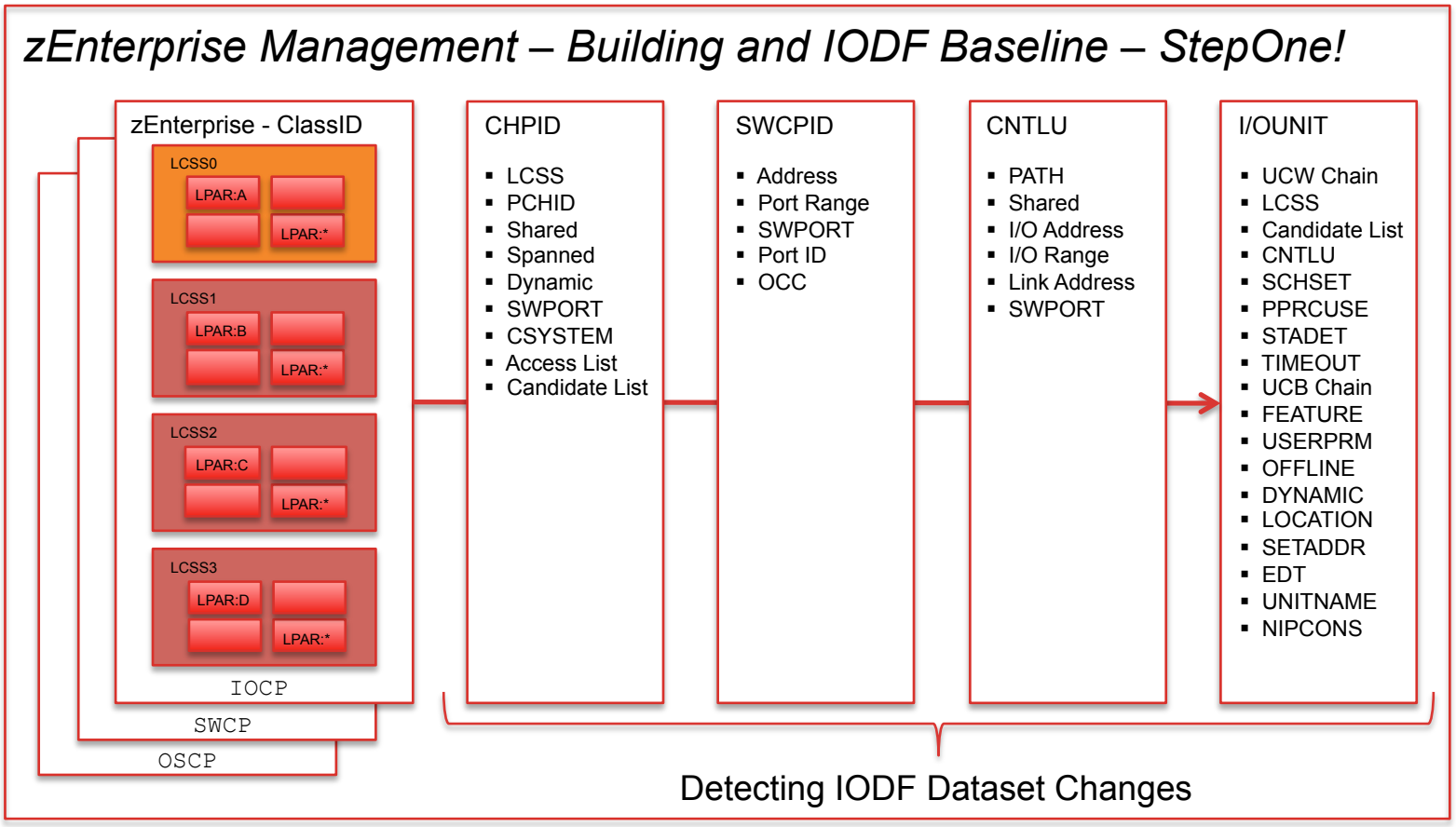

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Presentation Outline

1. Our Mission - (1/4)
   - ✓ What is Compliance?
   - ✓ The Need for Shared Values
   - ✓ Critical Success Factors
   - ✓ System Control Points
   - ✓ Organizational Acceptance
   - ✓ Cost of Implementation
2. IODF - the Absolute zControl Point! - (3/4)
   - ✓ The Basic Elements of the Input/Output Definition File (IODF)
   - ✓ Understanding the Origin of Key System Vulnerabilities
   - ✓ Increasing Audit Interest in using the IODF as a System Control Boundary
   - ✓ How System Complexity is driving the need for New Thinking
   - ✓ The Future of the zEnterprise Configuration Process
   - ✓ How to Build an IODF based Configuration Base – StepOne
3. Health Checker - Hands-on Lab - *Recommended*

   Tuesday, August 9, 2011
   1:30 – 2:30PM
   Asia 2
4. Resources, References and Sessions - *Recommended*

   z/Auditing Essentials - Volume 1
   zEnterprise Hardware - An Introduction for Auditors
   Edited By Julie-Ann Williams - julie@sysprog.co.uk

SHARE in Orlando 2011

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Publications:

- Hardware Configuration Definition User's Guide: V1R12 – SC33-7988-09
- HCD Reference Summary: V1R12 – SX33-9032-05
- MVS Initialization and Tuning Reference – SA22-7592-21
- MVS System Command Reference – SA22-7627-24
- HOT Topics – February 2011 – Issue 24
- CICS Audit Essentials – Julie-Ann Williams, Cairns, Warren, and Underwood
- CICS Best Practices – Julie-Ann Williams, Craig Warren and Martin Underwood
- Mainframe Audit News – Stu Henderson, The Henderson Group
- Information Security – NIST Publication 800-53 – February 2009
- NAIC Model Audit Rules & Implementation – Deloitte
- AUDIT.NET

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Hands-on Lab – The IBM Health Checker for zOS

Abstract:

Getting the IBM Health Checker up and running and customizing the Health Checks for your z/OS systems is easy to do. This self-directed lab will lead you through the process step by step. The lab is intended for those with little or no experience with the Health Checker. Attendees should have knowledge of TSO and JCL.

Session:

Tuesday, August 9, 2011
1:30 – 2:30PM
Asia 2

Instructor:

Mr. Gordon Daniel, Director Development
NewEra Software, Inc.

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Join the Peer Review Team:

z/Auditing Essentials - Volume 1
zEnterprise Hardware - An Introduction for Auditors

Edited By Julie-Ann Williams - julie@sysprog.co.uk

Authors:

- Julie-Ann Williams
- Craig Warren
- Martin Underwood
- Steve Tresadern

Session 10103: Compensating Control
Tuesday, Oceanic 6, 9:30AM

That's it folks, all done!

Session Evaluation - Session Number - 10100

Thank You!

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