

Impressive IBM Tivoli Service  
Management Center for System z  
Delivers Enterprise-wide Service  
Management, Exploits Mainframe  
Strengths

## About this White Paper

The new **IBM Tivoli Service Management Center for System z (SMCz)** turns the mainframe into an enterprise-wide service management hub, centrally managing business and IT services over the whole enterprise IT infrastructure (*mainframe and distributed*) whilst leveraging unique System z Quality of Service (QoS) strengths. SMCz uses open industry standard Information Technology Infrastructure Library (ITIL)-based best practice processes for automation, themselves based on the rigorous processes first refined in mainframe environments over many earlier years of hard-won experience. Announced with the new System z10 mainframe generation, and launched from late May 2008, SMCz is a hugely important, strategic IBM System z software advance, which this new White Paper addresses in depth.

SMCz is based on the sophisticated, impressive IBM Service Management (ISM) strategy/architecture that IBM Tivoli developed, and first launched in late 2006. ISM aimed to deliver major improvements in IT service management, through its advanced architecture, a new generation of service management/process automation software, ITIL-based best practices, backed by complementary IBM professional services, and the IT giant's extensive best-practices experience.

SMCz and ISM result from several \$B of IBM Tivoli investments, in numerous Independent Software Vendor (ISV) acquisitions, and in five years of intense development to date. These have now delivered a formidable, world-leading portfolio of Enterprise Service Management (ESM), plus enhanced operational management, software for both the System z mainframe (SMCz), and also for distributed platforms.

In this new, mid-2008, in-depth White Paper, specialist mainframe analysts Software Strategies fully assess SMCz and what it means for enterprise IT users. The White Paper contains:

- **Section 1:** Provides an executive summary/synopsis of our around thirty main findings from the full White Paper research, for busy executives.
- **Section 2:** Examines why the industrialization and automation of IT has become so vital in today's more turbulent economic times.
- **Section 3:** Recaps the System z mainframe's resurgence/growth, soaring new-to-z workloads, new enterprise-wide roles, the spectacular new-generation System z10 mainframe line, rocketing Service Oriented Architecture (SOA) adoption, and winning Total Cost of Ownership (TCO) economics with stellar "green IT" credentials.
- **Section 4:** Discusses system management issues on and around the System z mainframe, and in heterogeneous enterprise IT environments.
- **Section 5:** Introduces and assesses IBM's sophisticated, ambitious, and compelling ISM strategy and architecture, which is the basis for SMCz.
- **Section 6:** Introduces, overviews, and assesses the whole SMCz offering that makes the mainframe into the enterprise hub for improved business services management, and automation with ITIL best practices, across the whole organization.
- **Section 7:** Reviews the six SMCz component domains of functionality and introduces each individual IBM Tivoli software product supporting these.
- **Appendices A & B:** Reviews the base IBM System server and storage platform management tools that feed the IBM Tivoli offerings.
- **Appendix C:** Examines/assess each main SMCz software product in more detail.

SMCz is one of four major System z software domains that IBM has brought to market in the nine months to mid-2008; the most impressive raft of mainframe software advances ever. These closely complement the impressive new System z10 Enterprise Class new mainframe hardware. The three other domains equip System z as the ideal enterprise-wide hub for **Service Oriented Architecture** (*the new generation of enterprise applications*), and for **Information On Demand (IOD)**, and also bring a far-extended System z **Application Development/Enterprise Modernization (AD/EM)** tools portfolio. SMCz is closely coupled to these other complementary, major host software advances.

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# White Paper

## Impressive IBM Tivoli Service Management Center for System z Delivers Enterprise-wide Service Management, Exploits Mainframe Strengths

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# 1. Executive Summary

Our main findings are summarized below, drawn from our analysis in this White Paper's main sections. Links are noted below:

- 1. Widespread Economic Turbulence in 2008:** The global credit crunch, plus sharp commodity and energy prices increases, saw economies weakening and stock markets falling across some regions. The disruptive economic forces making business climates so challenging this year are highlighted in Figure 1. After years of benign growth, such disruptive forces inflicted severe shocks on many sectors, whilst a lucky few benefited richly.



**Figure 1: Challenging Mid-2008 Business Climate – Demands Stronger, IT-enabled Business Service Solutions**

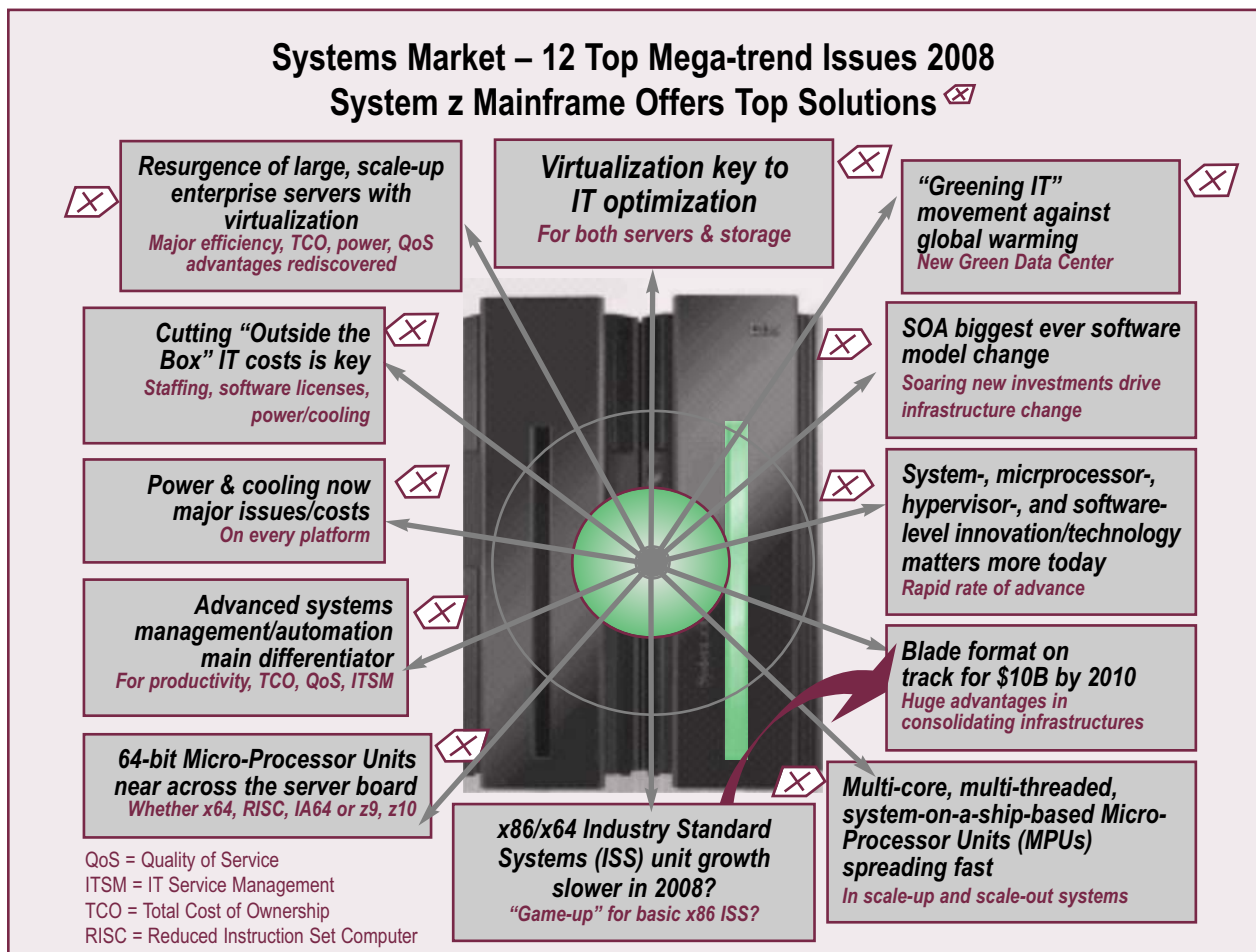
- 2. Operational Costs Still Dominate IT Spends:** Enterprise IT budget studies all show 75-80% (average +/-) of total IT costs go to operate, manage, and support existing IT applications and infrastructures. Sharply slashing such “IT status-quo costs” can best release today’s tighter IT budget resources to fund vital new IT initiatives that this economic stress demands. But how can this be done? What initiatives can best release major IT operations savings?
- 3. Enterprise IT’s Call to Action:** Harder economic/business conditions (*which may persist*), force enterprises to radically improve business model core processes faster, even for survival. Today, nearly every business change initiative is IT-driven/enabled. Enterprise IT groups must now deliver vitally needed strategic business changes from flatter IT budgets. “Doing more, faster, with less” is again mandatory for Chief Information Officers (CIOs). The question is how?
- 4. IT Operations Industrialization – The New Frontier:** Other industries were transformed, even created, many decades ago by industrialization and automation: Henry Ford’s pioneering of automobile mass-production was one good example. After sixty years of commercial IT, industrialization and automation of IT operations have just become such a practical reality on a major frontier of today’s IT advancement.
- 5. IT Service Management (ITSM) Key:** This fast-maturing discipline combines new service management software technologies now able to automate major IT operations processes, with proven best practices. ITSM delivers radical efficiency advances in IT operations; therefore greatly extended process automation brings lower costs. Today, ITSM offers CIOs their best option to free-up substantial IT operations resources.

**6. IBM Strong IT Operations Management Software Leader:** IBM Tivoli again held wide-margin revenue share leadership in IT operations management software, with a 24.5% share (*twice its nearest competitor*) in this \$12.9B 2007 market. IBM grew (+14.5%) faster than market and its main competitors, posting its sixth consecutive year of leadership. (\*\*Gartner data – see source citation on page 15.)

*IBM Tivoli again held wide-margin revenue share leadership in IT operations management software, with a 24.5% share...*

**7. Major IBM Service Management (ISM) Advances:** Several \$B of investment in important Independent Software Vendor (ISV) acquisitions, and extensive in-house developments, vaulted IBM Tivoli to foremost enterprise ITSM vendor status. A major 2008 offering here, the **IBM Tivoli Service Management Center for System z (SMCz)** is the focus of this White Paper. SMCz melds IBM's latest ISM software, Information Technology Infrastructure Library (ITIL) best practice processes, the rich IBM Tivoli operational management software portfolio, plus the System z mainframe. These combine to create a robust hub for business service management enterprise-wide. (Points 1 to 7 are covered in Section 2.)

**8. 2008 Systems Market Mega-trends:** Our top 12 2008 system market mega-trends are shown in Figure 2. IBM's System z mainframe addresses, exploits, or delivers to, at least ten of these. In our context here, the highlighted "Advanced System Management/Automation" issue is our topic.



**Figure 2: Systems Market – 12 Top Mega-trend Issues 2008 – System z Mainframe Offers Top Solutions**

**9. Strong Mainframe Resurgence:** IBM's multi-\$B, decade-plus-long transformation won System z burgeoning new-to-mainframe workloads, new enterprise-wide roles, and swelling resurgence this decade. Million Instructions Per Second (MIPS) installed rocketed six-fold from 1997 to 2007, topping 12.0 million MIPS (*end-2007*). Specialty processor engines, IBM's advanced z middleware/tools software, and radical price cuts, enabled this sharp z growth. The prior System z9 generation's success ramped-up the resurgence, as developed IT markets re-embraced the mainframe, which also won many all-new footprints in China, Brazil, India, Russia and other growth markets.

- 10. Leanest, Greenest, Lowest-cost Platform:** Contradicting old myths, years of radical IBM mainframe hardware/software cost cuts, virtualization-based efficiency, extensive automation-driven low staff needs, plus outstanding “green IT” strengths, made System z today’s far lowest-TCO-cost and far greenest IT platform for many larger, mixed, commercial workloads today.
- 11. New z10 Mainframe Generation – Huge Leap Forward:** The ultra-high-capacity, new System z10 Enterprise Class (z10 EC) high-end mainframes, powered by deeply impressive IBM z10 quad-core, ultra-high frequency (4.4GHz.) processor chips, hit the market at the end of February 2008. The z10 offers huge capacity (*up 70%*), outstanding performance (*now close to the best UNIX figures*), economic gains (*35% price/performance gain*), and many other advances, the biggest inter-generation leap ever. Optimized for target workloads (*new & traditional*), and new roles, the z10 EC now scales up to a 64-Way Symmetric Multiprocessor (SMP) of over 30,000 MIPS capacity, leveraging massive chip (*182GB/s*) bandwidth, and 2+X faster InfiniBand Input/Output (I/O) technology for huge throughput.
- 12. Unrivalled Enterprise Server Leader – Near-UNIX Performance:** IBM’s \$3.5B System z10 direct investment (*hardware & software*) has delivered clearly today’s most advanced, sophisticated, and efficient enterprise platform. Legendary extreme virtualization, highest utilization, reliability, security, and availability are further extended, and rich new IBM software power is added. The System z10 now adds near-UNIX-level performance (*a first*), lowest footprint, lowest power and cooling needs, lowest support staff levels, industry-best Disaster Recovery/Business Continuity (DR/BC), and lowest Total Cost of Ownership (TCO).
- 13. Unprecedented System z Software Advances Hit 2008 Pinnacle:** IBM Software drove continuous, large advances in, and major new additions to, its System z middleware/tools software stack that sharply accelerated from 2004-2008. For 2008, IBM’s major software advances focused on four domains:
- **IBM Smart SOA with Process Integrity & Business Process Management (BPM) on System z (IBM WebSphere).**
  - **Application Development & Enterprise Modernization on System z (IBM Rational).**
  - **Information On Demand (IOD) on System z (IBM Information Management).**
  - **IBM Tivoli Service Management Center for System z (IBM Tivoli).** This White Paper’s focus.

We assess that these, by mid-2008, brought IBM’s System z software stack “best ever” status in its 44-year history, and to clear industry leadership in these focus areas. (*Points 9 to 13 are covered in Section 3.*)

- 14. Enhanced Management/Automation a Top System z Priority:** New mainframe workloads and enterprise-wide roles created real management challenges. Service Oriented Architecture (SOA) demands end-to-end business services management, and more automation based on best practice IT processes. Users need service management tools and better processes to manage, monitor, support, secure, account for, and optimize diverse workloads, over their heterogeneous infrastructures, and on/from their central System z mainframe(s).
- 15. Superior IBM Base Systems & Storage Managers:** IBM’s unified server system and storage management foundations – **IBM Systems Director** and **IBM TotalStorage Productivity Center** suites – provide excellent bases and are assessed in Appendix A and B of this White Paper. They manage physical and virtualized environments for IBM server and storage systems respectively (*plus most third-party servers/storage*) at the platform level. Elegant, modern, well-integrated, Eclipse-based tools, these capable base management suites feed up into IBM Tivoli enterprise management/automation portfolio tools.
- 16. ISM Established:** IBM launched a compelling ITSM strategy (*with distributed platform products*) for enterprise-wide business and IT services management in October 2006. Aimed to overcome the challenges above, these high-function ISM products, services, and knowledge capabilities now supported enterprise business service and composite Web application management, with ITIL best practices and new process automation.
- 17. ISM & SMCz – Huge IBM Tivoli Investments:** Researching, developing, and creating the ISM (*and now also SMCz*) architecture, products, best practices knowledge bases, and services was a vast undertaking – even for IBM – over the five years from 2004 to 2008. Significant ISV acquisitions (*see point 18 below*) and extensive, in-house, IBM Tivoli development cost several \$B, and delivered scores of new/enhanced (*ISM & SMCz-enabling*) IBM Tivoli products, many on System z, plus supporting best practices and services. IBM now offers the market’s leading Enterprise Service Management (ESM) platform.

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*IBM launched a compelling ITSM strategy for enterprise-wide business and IT services management in October 2006.*

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**18. IBM Tivoli ISV Acquisitions Extend System z SMCz, ISM Portfolio:** Just examples from IBM's 50-plus-company ISV acquisition trail of the last decade. Six service management-centered, some System z-related, ISV buys especially contributed to IBM Tivoli's leadership ISM & SMCz offerings. All of these ISV products are now fully integrated into the IBM Tivoli portfolio:

- **Candle Corporation, April 2004:** OMEGAMON XE family, mainframe performance monitoring/analysis market leaders.
- **CIMS Labs, Inc., January 2006:** Advanced usage accounting/chargeback software for virtualized systems, including z.
- **Micromuse, Inc., February 2006:** Leadership Netcool portfolio of network management tools for service providers and enterprises.
- **Consul Risk Management, Inc., December 2006:** Compliance/audit software to track/investigate non-compliant behavior, also mainframe security administration tools.
- **Isogon Corporation, July 2005:** Leading mainframe-based software asset management solutions ISV.
- **MRO Corporation, August 2006:** Public ISV, leadership Maximo Enterprise Asset Management (EAM) solutions, platforms, and tools suite.

*(Points 14 to 18 are covered in Section 4.)*

**19. IBM SMCz Debuts:** Revealed at the System z10 launch, and formally announced late-May 2008, SMCz equips System z as the centralized hub of end-to-end business service management for the enterprise, our White Paper's focus. Extensively integrated SMCz solutions add high-function (ISM-based) service management software, linked to established IBM Tivoli operational management tools, both exploiting unique System z strengths, to deliver business service/IT operations management using ITIL best-practices and advanced process automation.

*...SMCz equips System z as the centralized hub of end-to-end business service management for the enterprise...*

**20. SMCz Brings New Levels of Visibility, Control, and Automation:** SMCz offers enterprises running large, complex IT environments, including both host mainframe and distributed systems, major improvements in visibility, control, and automation. It offers adopters unmatched system availability and reliability for business-critical applications, and deploys extensive automation to eliminate errors and cut operations costs. It allows the business of IT to be managed like a business.

**21. SMCz's Six Software Domains:** The new SMCz ESM hub role is now extensively supported by six domains, each offering comprehensive, highly integrated IBM Tivoli software. These support the three layers of the SMCz architecture as noted. These six domains are:

1. **IBM SMCz Process Management Solutions.** *(Top level of the ISM, SMCz shared architecture.)*
2. **IBM Tivoli Service Management Platform (ITSMP) on System z Linux.** *(Middle-level of ISM, SMCz shared architecture.)*
  - 3.1. **SMCz – Transforming Enterprise-wide IT Financial Management Domain.** *(Lower level of SMCz architecture.)*
  - 3.2. **SMCz – Enhancing Enterprise-wide IT Security Management Domain.** *(Lower level of SMCz architecture.)*
  - 3.3. **SMCz – Operations and Production Control Domain.** *(Lower level of SMCz architecture.)*
  - 3.4. **SMCz – System Monitoring & Performance Management Domain.** *(Lower level of SMCz architecture.)*

Short synopses of each SMCz domain's coverage, and of the main IBM Tivoli tool supporting it, are shown below in points 22 to 27, and covered more fully in this White Paper. *(Points 19 to 21 are covered in Section 6.)*

**22. IBM SMCz IT Process Management Solutions:** ISM provided a broad set of ITIL best-practices-based process managers, each optimizing, improving, and automating a major operational IT process, listed below. SMCz is now bringing these process managers to the System z (Linux) platform, enabling SMCz to serve as an enterprise-wide, automated hub for those core processes. These process managers are built upon, and run on, the ITSMP foundations summarized in point 23 below:

- **IBM Tivoli Service Request Manager (ITSRM) V7.1.**
- **IBM Tivoli Release Process Manager (ITRPM) for System z Linux V7.1.**
- **IBM Tivoli Business Continuity Process Manager (ITBCPM) for System z Linux V7.1.**
- **IBM Tivoli System Automation Application Manager (ITSAAM) (for z/OS or zLinux) V3.1.**
- **IBM Tivoli Availability Process Manager (ITAPM).**





- IBM Tivoli Capacity Process Manager (*ITCPM*).
- IBM Tivoli Storage Process Manager (*ITSPM*) V6.2.1.
- IBM Tivoli Business Service Manager (*ITBSM*) V4.1.
- IBM Tivoli Unified Process Composer (*ITUPC*) V7.1.
- IBM Tivoli Unified Process (*ITUP*).
- IBM OPAL – Open Process Automation Library.

**23. SMCz IT Service Management & Process Automation Functionality Extensive:** This SMCz domain provides the ITSMP, IBM's foundation for ESM, hosted here on System z. It includes enterprise-wide service request management, service catalog support, and automated application and dependency discovery. Also provided are IBM's high-function change and configuration management database, and business services management with real-time service dashboards/visualization, and with servers hosted on the System z Linux environment. New/enhanced IBM Tivoli products supporting these SMCz functions include:

- IBM Tivoli Service Request Manager (*ITSRM*) V7.1.
- IBM Tivoli Application Dependency Discovery Manager (*ITADDM*) for System z Linux V7.1.
- IBM Tivoli Change & Configuration Management Database (*ITCCMDB*) for System z Linux V7.1.1.
- IBM Tivoli Business Service Manager (*ITBSM*) V4.1.
- IBM Tivoli Service Management Platform (*ITSMP: ITSRM, ITADDM, ITBSM, & ITCCMDB together*).
- IBM Tivoli Enterprise Portal (*ITEP*) V6.2.
- IBM Maximo Asset Management (*IMAM*) V7.1.

**24. Extensive SMCz IT Financial Management Support:** SMCz delivers unrivalled enterprise IT financial management support.

This domain includes integrated, enterprise-scale IT asset management, IT resource usage accounting and chargeback, software license management, and IT contract management/compliance applications. All of these are centered on System z. These extensive tools enable IT organizations to better control their costs, and to optimize financial management processes, including budgeting, planning, procurement, analysis, asset inventory, and license compliance. The tools include:

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*SMCz delivers unrivalled enterprise IT financial management support.*

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- IBM Tivoli Usage and Accounting Manager (*ITUAM*) z/OS Option V7.1.
- IBM Tivoli Decision Support (*ITSDS*) for z/OS V1.8.
- IBM Tivoli License Compliance Manager (*ITLCM for z/OS*) for z/OS V4.3.
- IBM Tivoli License Compliance Manager (*ITLCM*) for System z Linux V4.3.
- IBM Tivoli Contract Compliance Manager (*ITCCM*) V3.7.2.

**25. SMCz IT Security Management:** The crucial SMCz security management domain includes enterprise-scale user security administration, user authentication, security monitoring and intrusion defense, and security auditing/compliance support that complement/extend unrivalled System z platform security. IBM Tivoli products supporting these SMCz functions include established System z and cross-platform IBM security products, together with newer, higher-level security service management products. These include:

- IBM Tivoli Directory Server (*ITDS*) for z/OS, zLinux, & z/VM V6.1.
- IBM Tivoli Directory Integrator (*ITDI*) for z/OS & System z Linux V6.1.
- IBM Tivoli Identity Manager (*ITIM for z/OS*) for z/OS V5.0.
- IBM Tivoli Identity Manager for System z Linux V5.0.
- IBM Tivoli Access Manager for e-Business (*ITAM for e-Business*) for System z Linux V6.0.
- IBM Tivoli Access Manager for Operating Systems (*ITAM for OS*) for System z Linux V6.0.

- IBM Tivoli Federated Identity Manager (*ITFIM*) for z/OS V6.1.
- IBM Tivoli Federated Identity Manager (*ITFIM*) for System z Linux V6.1.
- IBM Remote Access Control Facility (*RACF*) family on z/OS, z/VM.
- IBM Tivoli zSecure Suite, supports z/OS, z/VM, CICS, RACF V1.9.1
- IBM Tivoli Compliance Insight Manager (*ITCIM*) Enabler for z/OS V8.5.
- IBM Tivoli Security Operations Manager (*ITSOM*) V4.1.
- IBM Tivoli Security Information and Event Manager (*ITSIEM*) V1.0. (*Combines 2 products above.*)
- IBM Tivoli Security Compliance Manager (*ITSCM*) V5.1.

**26. SMCz Mainframe Operations & Production Control:** This SMCz domain covers smooth running of all scheduled workloads/jobs across, and managing the whole IT infrastructure, of both System z mainframes and distributed platforms. It includes console/server management, workload job and output scheduling, system automation, network management, storage management, operations troubleshooting, and issue resolution. Select new, or enhanced, SMCz-related IBM Tivoli products, for scheduling and automation only, include:

- IBM Tivoli Enterprise Portal (*ITEP*).
- IBM Tivoli Workload Scheduler (*ITWS*) for System z Linux V8.4.
- IBM Tivoli Workload Scheduler (*ITWS*) for z/OS V8.3.
- IBM Tivoli Workload Scheduler for Applications (*ITWS for Applications*) (*for z/OS & zLinux*) V8.4.
- IBM Tivoli Dynamic Workload Broker (*ITDWB*) V1.2.
- IBM Tivoli Workload Scheduler for Virtualized Data Centers (*ITWS for VDC*). (*AIX, Linux.*)
- IBM Tivoli Workload Scheduler LoadLeveler (*ITWSL*). (*AIX, Linux.*)
- IBM Tivoli System Automation (*ITSA for z/OS*) for z/OS V3.2.
- IBM Tivoli Systems Automation for Integrated Operations Management (*ITSA for IOM*) V2.1.
- IBM Tivoli System Automation for Multiplatforms.

Extensive IBM Tivoli storage and network management portfolios complementing System z and the above are also offered, but are not reviewed in this White Paper.

**27. SMCz Performance Management:** This SMCz domain covers performance monitoring and analysis, trend analysis, and capacity planning, for and across all enterprise IT infrastructure resources, to assure service availability and response times/speed for Service Level Agreements (*SLAs*) are met. This especially includes applications, but also systems, subsystems, storage and networks. Enterprise-wide incidents and event management and event correlation are also included. Select new/enhanced IBM Tivoli products supporting these SMCz functions include:

- IBM Tivoli OMEGAMON XE family, most for z/OS, most V4.1.0. (*IBM brand for System z monitoring. Long list of versions.*)
- IBM Tivoli Monitoring (*ITM*) family V6.2. (*Core technology and products for distributed platforms, also in above.*)
- IBM Tivoli Performance Analyzer (*ITPA*) V6.1.
- IBM Tivoli Composite Application Manager (*ITCAM*) family:
  - IBM Tivoli Composite Application Manager for SOA V7.1.
  - IBM Tivoli Composite Application Manager for Internet Service Monitoring V6.1.
  - IBM Tivoli Composite Application Manager for Response Time Monitoring V6.2.
- IBM Tivoli NetView (*ITN*) (*for z/OS*) V5.3.
- IBM Tivoli Netcool/OMNibus family.

(Points 22 to 27 are developed in Section 7, with brief cameos of each product listed.) Our fuller assessments of most listed products are also offered in Appendix C to back these up more deeply.

**28. SMCz's Extensive Integration a Huge Plus Point:** Crucial to SMCz's cohesive, end-to-end ESM power are the many scores of in-built standard integrations provided between these IBM Tivoli tools with other related tools. These extensive standard integrations are complemented by the wide array of custom integration options built into most of the IBM Tivoli SMCz portfolio, and by the IBM OPAL collection of 900 plus pre-built, validated, contributed integrations that solve many extra needs.

**29. Linux on System z – Excellent SMCz Platform Choice:** IBM offers many SMCz products on System z Linux. We found this to be an excellent choice; best fitted to run new centralized ESM/process automation workloads. Linux allowed far faster software porting to System z, offers lowest TCO mainframe processing (*with Integrated Facility for Linux (IFL)*), and is well isolated from z/OS and z/VM production workloads. SMCz can network "inside the box" (*HiperSockets*) at wire speed and low latency with live subsystems, other applications, and databases running there. SMCz is a thus a perfect fit for Linux on System z; it will also encourage many hundreds of new SMCz-adopting customers into the zLinux fold yearly, to expand the current 2,500-plus strong (*and growing fast*) System z Linux user base.

**30. Flexible SMCz Entry Points – Fast Return On Investment (ROI), One Step at a Time:** IBM's flexible SMCz entry-points allows step-by-step ITSM implementation. Each entry-point solution addresses a pressing business need, is a modest investment quickly implemented, and so brings a high ROI quickly. Incremental gains flow as starter projects are broadened step-by-step, for wider benefits, without any "big-bang" transition risks.

**31. Many Further SMCz Advances Due Thru 2008:** This White Paper covers the huge number of IBM Tivoli software advances supporting SMCz that had already been announced, and mostly delivered, by time of writing. (*Mid-September 2008*). An extraordinary number (*29 new IBM Tivoli product releases/products*) of additional software releases are now also scheduled for delivery within 2008. These were disclosed in an August 12<sup>th</sup> 2008 IBM preview, and cover performance/availability management, storage management, security management, and infrastructure/business management. The message is very clear, a lot more advances for SMCz are due shortly, strengthening the case further.

*...IBM will now win two-to-three thousand additional System z10 installations globally in next three years, half of which will be brand-new-to-mainframe customers.*

**32. Expect System z10 to Win Two-to-three Thousand More Footprints by 2010:** The new-generation System z10 mainframe brought extraordinary power, capacity, performance, TCO, plus many other advances. IBM's 2008 industry-leadership-class System z software domain advances, SMCz our focus here (*but also equally strategic advances in Smart SOA, IOD, and Application Development/Enterprise Modernization (AD/EM) on System z*) took the joint platform to a new pinnacle of power, capability, and value. Based on these strengths, we firmly project that IBM will now win two-to-three thousand additional System z10 installations globally in next three years, half of which will be brand-new-to-mainframe customers.

## 2. Industrialization of IT Operations Dawns – Vital in Turbulent Economic Times

### IBM's System z-based IT Service Management (ITSM) Advance

This new White Paper is one of six complementary, 2008-published Software Strategies System z mainframe/software studies (see the "Related Software Strategies In-depth Mainframe Research" Section on page 81, items 1 to 5). It fully assesses the new **IBM Tivoli Service Management Center for System z (SMCz)** which was launched in May 2008. For the first time, SMCz enables the System z mainframe to assume a major new enterprise-wide role as the central hub managing and automating end-to-end business services. IBM Tivoli SMCz provides an advanced, tightly integrated software portfolio. This now enables all business services, both all of those running on the mainframe itself, but crucially also those running on distributed platforms, to be managed with superior Information Technology Infrastructure Library (ITIL) best practice processes that can be further automated from the powerful, single point of control on the System z.

*SMCz on System z marks the dawning of a major new era – the industrialization and automation of IT operations processes.*

SMCz on System z marks the dawning of a major new era – the industrialization and automation of IT operations processes. This development is of huge strategic business and IT significance to enterprises, from both the real business and IT viewpoints. 100 years ago, Henry Ford created the volume automobile industry that we know today, with his assembly-line mass-production of standardized automobiles in efficient, increasingly automated plants that drove down costs and allowed the automotive market to grow vastly. Now, after the now near-60-year evolution of commercial IT, a similar process of industrialization and automation of standardized IT operations is rapidly arriving, with similarly transformational implications for IT users.

Highlighting its major strategic importance, SMCz was IBM's premier software announcement accompanying its February 2008 launch of its spectacular, next-generation System z10 Enterprise Class (*z10 EC*) mainframes (see Section 3 around Figure 7 on page 22), which it hugely complements. Placing the mainframe central to its IBM Service Management (*ISM*) – see Section 5 – vision and strategy, IBM has now (May 2008) delivered innovative IBM Tivoli SMCz System z software tools that now enable the mainframe to assume this high-value, new role/function across the whole enterprise IT infrastructure.

In this Section 2, we first review the harsher economic and business climate from mid-2008, the pressing needs for enterprise business transformations and improvements, and the central enabling role that IT solutions now play in almost every such business initiative. However, most enterprise IT groups now face flat or lower budgets, with the large majority of their resources locked up supporting their existing applications/systems portfolios. Industrialization and automation of IT operations, which can only be achieved through advanced **ITSM**, offers the most compelling way to release IT budget resources for the needed new initiatives.

## Who Should Read this White Paper?

This White Paper was written for senior IT technical, operations management, and support, executives/managers in enterprise IT groups responsible for ITSM and operations. Those already using IBM mainframes today, as well as those now considering (*as many more now are*) moving onto the mainframe platform will find it of interest. This Paper is addressed to IT executives responsible for ITSM and operational business and IT service delivery/support, both on System z mainframe(s) and for their whole enterprise IT infrastructure. Our higher-level, shorter Executive Paper on this topic is also available for Chief Information Officers (*CIOs*) and Chief Financial Officers (*CFOs*). (See page 81, item 3.)

## Credit Crunch, Commodity Prices Triggered Downturn

2008's global financial markets were roiled by the severe credit crunch, triggered by unraveling USA sub-prime mortgage-backed investments, widely (*if unwisely*) bought by many banks and financial institutions around the world.

The lending drought that followed has affected many business sectors and economies. At the same time, most commodity prices, including food, oil/energy and metals had risen to record price levels, driven by rapidly rising demand from the high-growth economies, most notably from China and India, outrunning limited supplies, and also attracting much speculation. This drove up inflation, whilst the credit crunch caused property and stock market valuations to plummet, with inflation and unemployment now rising in many markets. This created a tougher business climate, and has raised recession fears in many sectors and geographies. Some of the major aspects of the economic slowdown these events have triggered are highlighted in our Figure 1 on page 5.

These adverse developments have sharply changed the benign business climate of steady growth and expansion most markets and enterprises enjoyed for the prior five years (*and more*). They sharply increased the pressure on most enterprises to maintain, or better still to improve, their business performance and governance to survive and thrive in such tougher times.

## Radical Business Changes Now Vital – IT Main Enabler

In these more difficult economic and business conditions (*likely to persist for a considerable time*), most enterprises must now adapt, change, and improve their business models and core processes much more sharply, even sometimes as a matter of survival. Today, almost every such significant business change initiative that enterprises can adopt to win now vitally needed gains are IT-application-solution driven and enabled. Implementing such business change initiatives requires enough free funds to invest in these IT enablers. Businesses depend on their enterprise IT group's (*and their IT supplier's*) joint ability to achieve timely delivery of such crucial new business services initiatives. Our "top fifteen" 2008 enterprise IT solution areas

*...most enterprises must now adapt, change, and improve their business models and core processes much more sharply, even sometimes as a matter of survival.*

enable many of the radical business improvements now needed, and are those that will attract the large majority of 2008-2012 new IT investment; these are shown in Figure 3 on page 13.

For many CIOs, the good years of regular IT budget increases may now be gone for quite some time. IT groups often now face loud business demands to deliver the above, vitally needed new, business-transforming solutions, but without much corresponding (*or any*) increases in IT budgets. They are again now expected to "**do more, faster, and with less or no more**". These enterprise IT groups must now change-up several gears and help their enterprises implement the vitally needed strategic business initiatives, enabled by the best mix of Figure 3's IT solutions, inside reduced or flat IT budgets. Squaring this difficult circle, and reconciling these conflicting pressures, is now a sharp call to action, demanding radical changes/advances within IT. No more "business as usual in the business of IT". The question and challenge is clear, but what is the solution? How can IT groups do both?

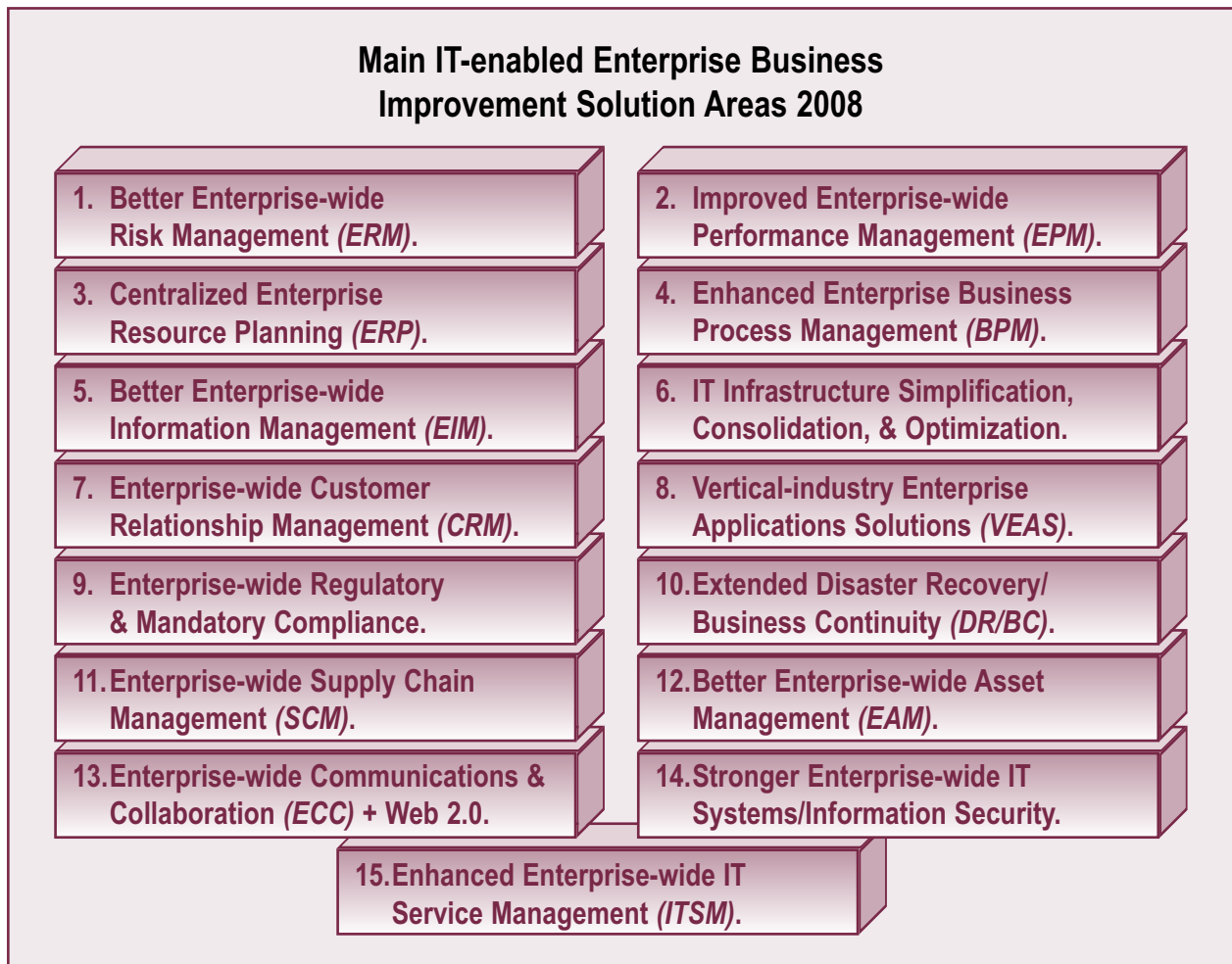


Figure 3: Main IT-enabled Enterprise Business Improvement Solution Areas 2008

## Bigger Gains When Business & IT Process Integration Combined

Studies clearly revealed that enterprises implementing extensive business and IT process integration attained significantly lower costs, much higher customer satisfaction, and much higher profit margins than their peers who did not. (*IBM Chief Executive Officer (CEO) Study 2007.*) To date, business process integration was too often seen as a separate discipline from IT process/management integration. Because today's IT systems and processes are now so tightly interwoven with, and are the primary support and enablement for, core business processes and services, this old divide no longer makes any sense. Business process integration/improvement must now be combined and developed simultaneously with IT process integration/enhancement, for much higher synergistic benefits. Managing all these improved business services optimally across the enterprise suddenly becomes absolutely vital for the improved business performance now expected and to cope with harsher market conditions.

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*Business process integration/improvement must now be combined...*

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## High “Status Quo” IT Operational Costs – Must Drive Down to Free Resources

Numerous IT spend studies showed that enterprise IT groups use 75-80% of their annual IT \$ budget (*and similar percentages of their IT staff capacity*) in just operating, maintaining and supporting their existing applications, systems, storage and network portfolios: merely maintaining the status quo. This leaves, on average, only around 20% of budget/resources for all new, business-supportive IT developments and improvements, capacity increases, and needed system replacements. In today's tougher times, it is only by sharply cutting these burdensomely high, semi-fixed, “status quo” costs of operating, managing, and supporting existing system estates that most IT organizations can free-up the money and staff resources for the vital, new, business-enhancing IT initiatives.

## IT Operations Industrialization – The New Frontier

Other industries were transformed, even created, many decades ago by industrialization and automation: Henry Ford's pioneering of standardized automobile, assembly-line mass-production was just the most famous example. Now in 2008, after some sixty years of commercial IT, the industrialization and automation of most IT operations have now finally become a practical reality, and represent a major new frontier of IT advancement. The discipline of **ITSM** (*introduced below*), is this key enabler of IT operations automation and of the "industrialization of IT operations". It offers the crucial route for IT organizations to break free from existing system support cost burdens, and to begin to free-up resources that can be used to implement the vitally-needed, business-driven, new IT initiatives stated above.

## ITSM – Powering New IT Industrialization Frontier

ITSM is the modern discipline of managing IT system operations. In today's harsher climate especially, IT must be more business-focused (*less technology-driven*), and must respond better to increased global business complexity, faster changes, cost and competitive pressures, and tougher compliance mandates. The fast-maturing discipline of ITSM combines powerful, newer software management technologies that can now automate all major IT operations processes based upon well-proven best practice frameworks. ITSM thus delivers radical advances in business/IT alignment, IT operations efficiency and process improvement, with much-extended automation bringing lower costs.

ITSM emphasizes improving the IT contribution to the real business of the enterprise. It focuses on managing and raising the end-to-end quality of **business services** (*see below*), and with improving relationships between IT operations and the business users and managers who use the applications supported (*sometimes fraught!*). ITSM is thus fundamental to **good IT governance**, which is vital today as boards hold IT groups more tightly accountable for overall business service delivery that must now meet faster-changing business needs.

ITSM is a process management/improvement-based discipline. It thus has much in common with leading business process improvement methodologies like Total Quality Management (*TQM*), Six Sigma, and Business Process Management (*BPM*), but dedicated to improving IT operational business service delivery.

## Business Services in ITSM

**Business services** (*as referenced above*) can be whole business processes, such as a new customer acquisition, or the processing of insurance claims. They may also be smaller components of a whole business process, such as a new customer credit check sub-process (*in a customer acquisition process*), or a loss adjuster reporting step (*in an insurance claims process*). Today, business services are often supported by several IT software components (*services*), middleware layers, and often run over multiple IT platforms and network links.

"**Service**" (*in this ITSM context*) may refer to any IT application or system we need to manage. Rapid, widespread, enterprise IT adoption of **Service Oriented Architecture (SOA)** as the major model of enterprise applications architecture for the next decade has brought service concepts to wider prominence. SOA sees applications as loosely coupled collaborating services that intercommunicate via messages, passed over an enterprise service bus, through standard interfaces.

New SOA business composite applications are assembled today by linking several software services (*existing and new*) into an improved **business workflow**, better supporting the real **business processes**. **BPM** is the control, optimization, and direction of business processes, including of the SOA systems that support them. Whilst SOA offers compelling benefits, it adds service management challenges, and increases the need for ITSM.

## ITSM Steps Far Beyond IT "Silo Resource Management"

ITSM greatly differs from traditional, technology-centric, IT resource/asset system management that monitors/manages each IT system, subsystem, or software layer individually. Such methods do bring worthwhile improvements in individual IT resource utilization, availability, and performance, all useful benefits but far too fragmented and limited. Consequently, in today's modern, distributed and globalizing businesses – heavily dependent on complex webs of IT applications and systems – such "silo" system management methods are far from enough.

"Resource silo management" cannot view **high-level business service performance** overall, measured in terms of real business service **Key Performance Indicators (KPIs)**. Business users/managers care only for such real KPIs that they use to measure the success of their business services/processes in meaningful business (*not IT technology*) terms.

They rightly expect business service management solutions to give them clear visibility on how their business service is performing against such business KPIs in real-time, and to clearly show whether/where the underlying IT solutions are impacting or enabling their business KPI attainment, in real-time, which ITSM now provides.

## Best Practices Frameworks for ITSM and ITIL

ITSM frameworks provide best practices guidance for all main IT operations areas. Most focused on ITSM is the ITIL framework; originally UK-government-developed and now broadly adopted worldwide. IBM made major contributions to ITIL development and refinement over many years, and is today foremost amongst its vendor supporters. The latest ITIL books – ITIL V3 – were published in May 2007. Control Objectives for Information and Related Technology (*CoBiT*), the other leading framework, is more broadly addressed to IT governance and control with a security focus. Several other frameworks provide partial support.

These frameworks define best-practice processes for all major IT operational areas, and thus facilitate and enable automation of these processes. Adopting well-proven, widely-used best practice processes from such frameworks significantly lifts IT performance and service quality, where the enterprise's current IT operational processes are not yet "best-of-breed" (*usually the case*). ITSM self-assessment tools now help IT groups to rate their current standing on best practices and pinpoint **Areas for Improvement (AFI)** in their service management.

Two main professional groups cover ITSM. These are the IT Service Management Forum (*ITSMF – an international, chapter-based group with close ties to ITIL and the International Organization for Standardization (ISO)/International Electrotechnical Commission (IEC) 20000 audit standard*), and the IT Service Management Professionals Association (*IT-SMPa – supports IT service managers with education and information sharing, etc.*).

ISO/IEC 20000 is the most relevant international standard for ITSM qualification, certification, auditing, and benchmarking. The first worldwide standard aimed at ITSM, it describes an integrated set of management processes for effective delivery of services to the business and its customers, closely aligned with ITIL's approach. ISO/IEC 20000 Certification and Qualification Schemes are owned/managed by the ITSMF.

## IBM is by Far the IT Operations Management Software Leader Again

IBM is the best-placed software and services vendor to pioneer and lead the industry-wide transition to business service-centric IT operations management, and the industrialization and automation of IT – starting with a commanding market lead in operations management software last year.

IBM again posted much the strongest revenue share, continuing its wide-margin leadership (*held for the past six consecutive years*) of the worldwide IT operations management software market for 2007, a new report\* from leading independent analyst firm, Gartner, Inc. found. (*\*"Market Share: IT Operations Management Software, Worldwide, 2007," authored by Rene Millman, July 2008.*)

The report showed that IBM again led all vendors by revenue, grew its share to 24.5% of this \$12.9B total revenue 2007 software market, nearly double the share of its nearest competitor. IBM grew its revenue by 14.1%, faster than this market's 13.5% growth, extending its lead whilst its closest competitors each lost their share.

IBM provides an extensive range of IT operations management software through its **ISM portfolio** (*assessed in this White Paper*) from its IBM Tivoli software division/brand. These offerings help businesses attain greater visibility into their IT operations, manage risk, and automate IT processes to help simplify and reduce the cost of running data centers.

## Our Analysis – Slash Excess IT Operating Costs With ITSM, System z

In mid-2008's far more difficult, post credit-crunch, economic climate, enterprises now face fiercer shareholder and market demands to achieve business performance improvements. Business transformations, business model innovations, and radically improving business processes have become imperative in these ultra-competitive, faster-changing, and harsher current markets. Innovative new IT applications solutions, built on SOA and often reusing established assets on the IBM mainframe, are prime enablers for enterprises to deliver these needed business transformations. But these investments must be funded from IT operations cost reductions now that IT budget levels are more constrained.

"Status quo" IT operating costs climbed vastly as enterprise IT infrastructures became sprawling, complex, multi-platform distributed environments over the last decade. A seminal IDC study found that global IT systems management, administration, support and power/cooling costs had increased by a near-incredible 5-fold, from \$34B to \$165B per annum, from 1996 to 2007. The latter was three times higher than worldwide new server spending (*\$54.4B in 2007*). Some 48M scale-out distributed servers were sold over those years, causing this IT operating costs explosion. Appealing (*at first sight*) for low hardware prices, these now-legacy distributed scale-out servers proved vastly costly to run, because of their sky-high "outside-the-box" costs that were at first often ignored. These costs included high support staffing and software license costs, large and climbing electrical power/cooling demands, high networking equipment and connection costs, as well as incredibly wasteful software, and server asset utilization (*hardware and software often just 5-10% utilized*). Three or more sets of servers for every major application greatly compounded this problem, and were needed for development, test, and production, often more when higher-availability was needed.

Many enterprise users are now wisely eliminating these grossly wasteful, legacy distributed server estates fast, by infrastructure consolidation, optimization, and virtualization initiatives. Such estates are today widely recognized as economic and environmental disasters that must be eliminated as fast as possible. Many users have now found that 35-50% of their distributed server workloads can today best be consolidated onto System z mainframes, using Linux under z/VM, and saving them many \$10M's to \$100M's in larger cases.

The recent explosion of IT power costs had often revealed an organizational gulf between the facilities team (*usually responsible for buildings and utility supplies*) and IT management (*responsible for IT systems*). In many organizations, IT management had little idea, or even concern, over their IT system electrical power and cooling energy consumption levels, because these costs fell on facilities budgets. Most enterprises are now trying harder to control, manage, and reduce these energy costs across functions. Greatly increased availability of IP-enabled sensors, and of IT-based software monitors (*IBM Tivoli and other*), are now providing the means to more accurately monitor, understand, control and reduce IT-driven energy costs.

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*In this harsher mid-2008-on global economic environment, these 'IT industrialization' developments now assume the highest strategic business and IT importance.*

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Managing and automating enterprise business services using ITSM technologies and best practices, harnessing the System z mainframe as the most efficient consolidation platform, and using it to host advanced enterprise-wide business services management and process automation offers major potential savings in IT operations, and major business services improvements. These combined can release significant amounts of "status quo" IT resources required to fund new business change-

supportive IT initiatives. The IBM Tivoli SMCz solution assessed in this White Paper enables these sharp improvements in service quality, and provides higher operations automation of business services management, on System z itself, but also over the remaining distributed estate. This makes SMCz a highly-strategic complement to the ongoing infrastructure optimization and improvement wave already centered on expanding workloads on ultra-efficient, lowest Total Cost of Ownership (TCO) System z mainframes.

These are deeply compelling, business, environmental and IT organization change drivers. In this harsher mid-2008-on global economic environment, these 'IT industrialization' developments now assume the highest strategic business and IT importance. The arrival of ISM on the recently renewed System z10, now enabled by IBM Tivoli's SMCz software, brings to bear a powerful new force to deliver this 'IT industrialization' enterprise-wide. Customers may use this to gain major business service improvements, and to win substantial and enduring IT operating cost reductions.

Over recent years, the IBM System z had already enjoyed powerful market resurgence and growth (*see Section 3*). This is now greatly boosted by the new System z10 mainframe generation's striking advances. IBM clearly brought the Tivoli SMCz strategy to the forefront of its mid-2008-on marketing with excellent timing as the premier software development featured with, and highly complementing, the new mainframe generation launch. The huge investments IBM made to deliver these new-generation mainframes, and all this advanced new software (*including SMCz*), have been warmly welcomed by mainframe users, partners, analysts, and the media. IBM Tivoli SMCz now offers enterprise users large advantages in better managing their enterprise-wide business services, now increasingly built on SOA composite applications spanning mainframe and other platform component services. SMCz's advanced process automation offers major relief to the excessively high share of IT budgets locked up with operating existing systems at the "status quo" level. It also multiplies these gains as wise users consolidate wasteful distributed server workloads and overly complex IT infrastructures, onto centralized, highly virtualized, more manageable System z10 (*and other*) more advanced, efficient, and economical server platforms.

### 3. Dramatic System z Mainframe Success in 2000 Decade Accelerates

This Section 3 next recaps the mainframe platform's continuing progress from 2006 through 2008, and its forward outlook, summarized here from our other extensive IBM mainframe research. (*See page 81 – all items.*) The purpose here is to place our IBM Tivoli Service Management Center for System z (SMCz) assessments and analyses in the correct overall context of the mainframe's evolution over this decade.

#### **Total Transformation + New Workloads = Strong System z Market Resurgence**

The IBM mainframe underwent a total, top-to-bottom transformation from 1993 to date, with ten new Complementary Metal Oxide Semiconductor processor technology generations released, six of the S/390 G series, and four of the post-2000, 64-bit z/Architecture System z, over that time. From February 26<sup>th</sup> 2008, the stunning quad-core-chip-powered, new-generation System z10 Enterprise Class (z10 EC) high-end mainframes began shipping, further extending the platform's impressive advances. A massive, sustained, many \$B of IBM investment/innovation transformed the platform's technology, economics, hardware capacity/capability, openness, and its software stack, to attain the outstanding leadership Quality of Service (QoS) capabilities and lowest Total Cost of Ownership (TCO) that IBM mainframes now offer today.



## 2000-Decade Mainframe Resurgence Grows – Capacity up 6-Fold

This decade-long IBM transformation (*of the now 44-year-established mainframe*) first triggered market revival, then full-on market resurgence, over this 2000-decade. Revival began with the z Series z900 (2000) and z800 (2002), and accelerated into resurgence with the z990 (2003) and z890 (2004). It strengthened further with high-end System z9 109s (Q3 2005) and with System z9 Business Class (z9 BC) and System z9 Enterprise Class (z9 EC) machines (*both July 2006*). IBM's Mainframe Charter (2003) publicly pledged rapid and continued innovation, value, and ecosystem development advances to customers. IBM has amply delivered upon those pledges yearly to date. The mainframe won back wide-margin market-share leadership (*in high-end servers*), saw installed capacity soar (*see Figure 4*), and saw growing numbers of new mainframe customers added to the user base (*now around 15,000 systems, 10,000 customers at end-2007*), recapturing renewed industry-wide esteem.

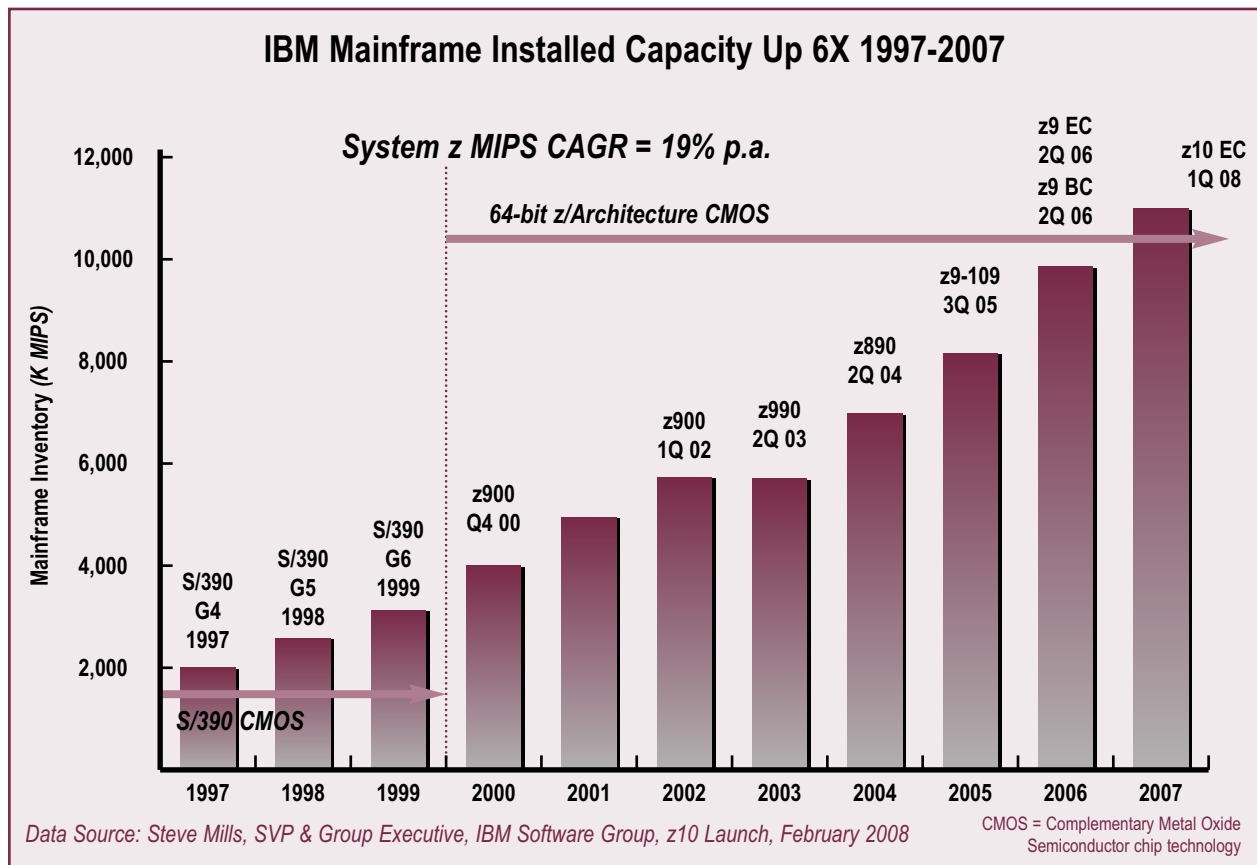


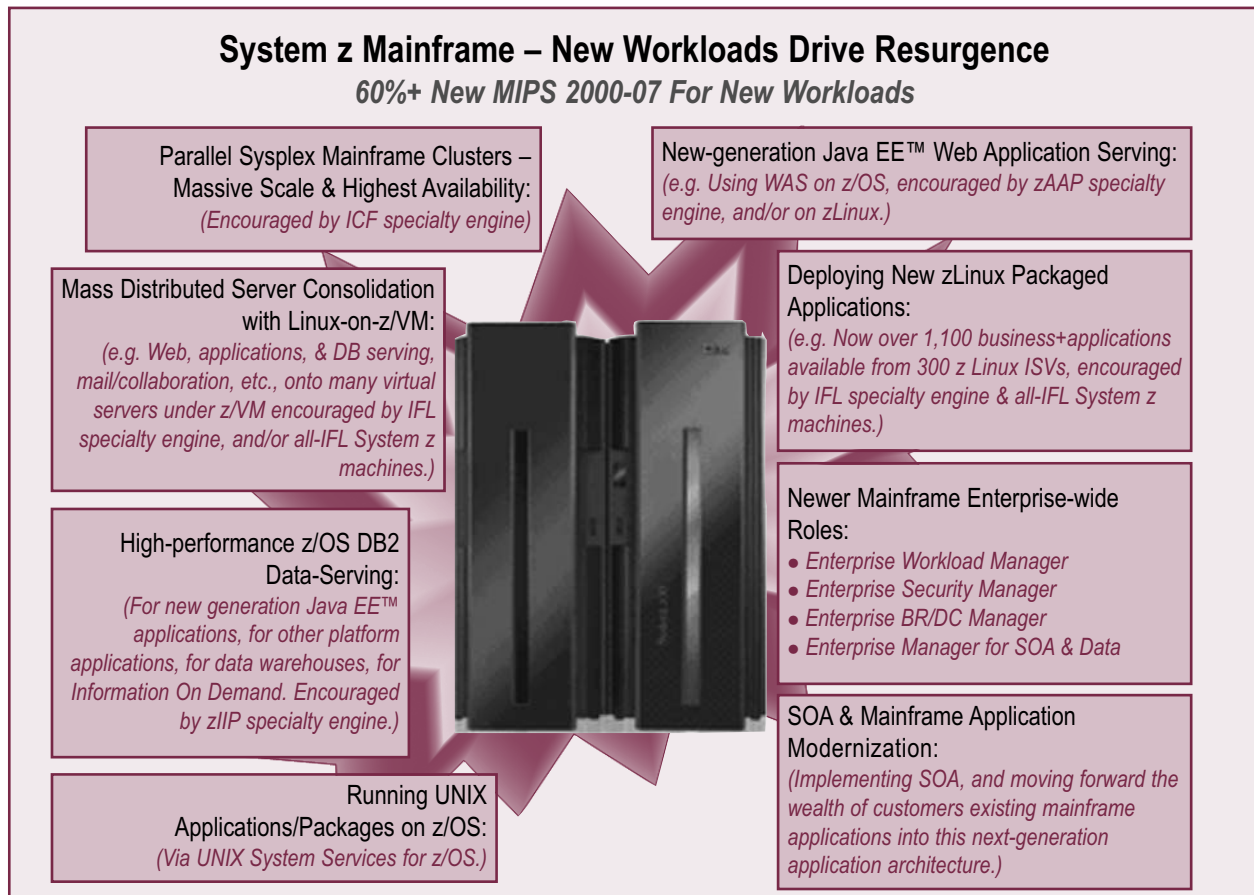
Figure 4: IBM Mainframe Installed Capacity up 6-Fold 1997-2007

A striking resurgence proof-point was the soaring global installed mainframe Million Instructions Per Second (MIPS) capacity, as indicated in Figure 4. Aggregate MIPS installed worldwide rocketed from 2.0M (1997) to 12.0M (2007), a six-fold increase over these eleven years. Now, the newest mainframe generation, led out by the impressive System z10 EC high-end systems (*profiled below and which became available on February 26<sup>th</sup> 2008*) are well poised to further extend this compelling record of mainframe growth.

## New Mainframe Workloads Drove Resurgence

Fast growing, new-to-mainframe workloads (*shown in Figure 5 on page 18*) were prime mainframe resurgence drivers. These included Linux applications, Java Enterprise Edition™ (Java EE™) applications, DB2 data serving, Service Oriented Architecture (SOA), horizontal Enterprise Resource Planning (ERP)/Customer Relationship Management (CRM) and vertical-industry-specific packaged applications, distributed server consolidation to Linux-on-z/VM, and dynamic Business Intelligence/Data Warehousing (BI/DW). These new workloads consumed well over 60% of all post-2000 mainframe MIPS sold.

IT professionals long recognized IBM mainframes for their legendary commercial transaction (CICS/COBOL, Information Management System (IMS), etc.) and batch workload processing capabilities. For these, the mainframe's refined, optimized, and balanced system architecture, and huge Input/Output (I/O) capacity, long provided superb performance, reliability, availability, security, and high throughput/utilization.



**Figure 5: System z Mainframe – New Workloads Drive Resurgence**

However, the modern System z mainframe has also proved itself to be the ideal, most fully virtualized, and most highly automated platform best able to run these fast-growing, new workloads that often need to be closely integrated with traditional mainframe applications. Today's mainframe is the pre-eminent, heavy-duty, commercial business applications and data serving (*transactional and batch, traditional and new workloads*) platform, best meeting demanding I/O bandwidth, and fast response-time, requirements. The platform now scales over a vast capacity range to support the needs from those of medium firms, up to those of the largest global enterprise.

These new mainframe workloads normally all run on a customer's well-utilized, shared System z mainframe(s), and require today's now-extensive IBM Tivoli System z system management software portfolio to fully deliver the platform's exceptional QoS. IBM Service Management (*ISM*) on System z is the subject of this White Paper.

### Specialty Engine Processors Made New System z Workloads Economic

Important enablers of this mainframe resurgence, showing healthy MIPS installed capacity growth, driven by the above burgeoning, new-to-System z-workloads growth, have been the successful System z specialty processor engines. Four types of these were introduced on System z in turn since the late 1990s. Qualifying workloads for each specialty engine type are automatically redirected onto those processors, and thus do not consume standard System z MIPS, nor drive up software costs.

- **ICF – Integrated Coupling Facility (1997):** Specialty processor engines for running System z Parallel Sysplex cluster coupling workloads in multiple System z Sysplex, and the Geographically Dispersed Parallel Sysplex (*GDPS*) multiple-site, cluster configurations.
- **IFL – Integrated Facility for Linux (2000):** Specialty processor engines for running mainframe Linux, either “on the metal” in a Logical Partition (*LPAR*), or under the z/VM extreme virtualization hypervisor. IFL MIPS installed have grown at a 70% Compound Annual Growth Rate (*CAGR*) since their 2000 introduction.
- **zAAP – System z Application Assist Processor (2004):** Specialty processor engine for running Java EE™ workloads, notably WebSphere Application Server, and related Java execution workloads. Now (2008) also extended to also run eXtensible Markup Language (*XML*) Systems Services (*on System z10, under z/OS V1.7+*). zAAP MIPS installed grew at a 91% CAGR since their 2003 introduction.

- zIIP – System z Integrated Information Processor (2006):** Specialty processor engines first offered to run three common DB2 database workloads. In autumn 2007, IBM extended the zIIP’s role with the addition of Internet Protocol Security (IPSec) network encryption, and select Independent Software Vendor (ISV) applications, as additional eligible zIIP workloads. In February 2008, IBM also added z/OS XML workloads, and remote data mirroring with System z Global Mirror (on System z10) workloads, to the zIIP-eligible list. zIIP MIPS installed grew at a 159% CAGR since their 2006 introduction.

IBM charges for specialty engines at far lower (as little as a quarter of System z general-purpose processors) fixed prices. These are \$95K on the z9 BC, and \$125K on z9 EC for the IFL, zAAP, & zIIP, the latter is the same on the new z10 EC for their full capacity (which is <580 MIPS on the z9 EC, <940 MIPS on z10 EC). Importantly, they also attract no System z system capacity-related software charges.

All-IFL System z mainframes (up to any available capacity) may be ordered for Linux-only workloads use. These mainframes are ultra-competitive for major enterprise Linux application and database serving, and for mass hosting hundreds of Linux virtual server workloads migrated across from wasteful, inefficient, physical distributed servers.

Using the powerful new 4.4GHz. IBM quad-core chips that drive the new z10 EC mainframe systems, each specialty processor engine (core) now delivers roughly 940 MIPS (of Large System Performance Reference (LSPR) – IBM’s definitive mainframe relative performance tables) capacity. This is up approximately 62% on the equivalent 580 MIPS rating of its z9 EC predecessor, at the same price. Customers already owning specialty engines, and upgrading onto a z10 EC, get these large increases in capacity.

As can be seen above, IBM has also systematically extended the range of eligible workloads that can benefit from its newer specialty engines since their introduction, adding further value and savings; a process expected to continue.

### Extended Enterprise-wide Mainframe Roles

Whilst engineering/optimizing System z to optimally run the new-to-mainframe workloads previously discussed onboard, IBM has also determinedly pursued a related strategic direction. This was to position, define, and to fully develop/equip the System z mainframe to take on new, enterprise-wide roles. IBM has implemented this strategy methodically, in multiple steps, equipping the platform to deliver truly new added value across the whole IT infrastructure, in each of these new enterprise-wide mainframe roles. Each of these roles addressed a set of difficult challenges/intractable issues deeply in need of major improvement in the typically over-complex, multi-platform IT infrastructures used by most large enterprise IT users.

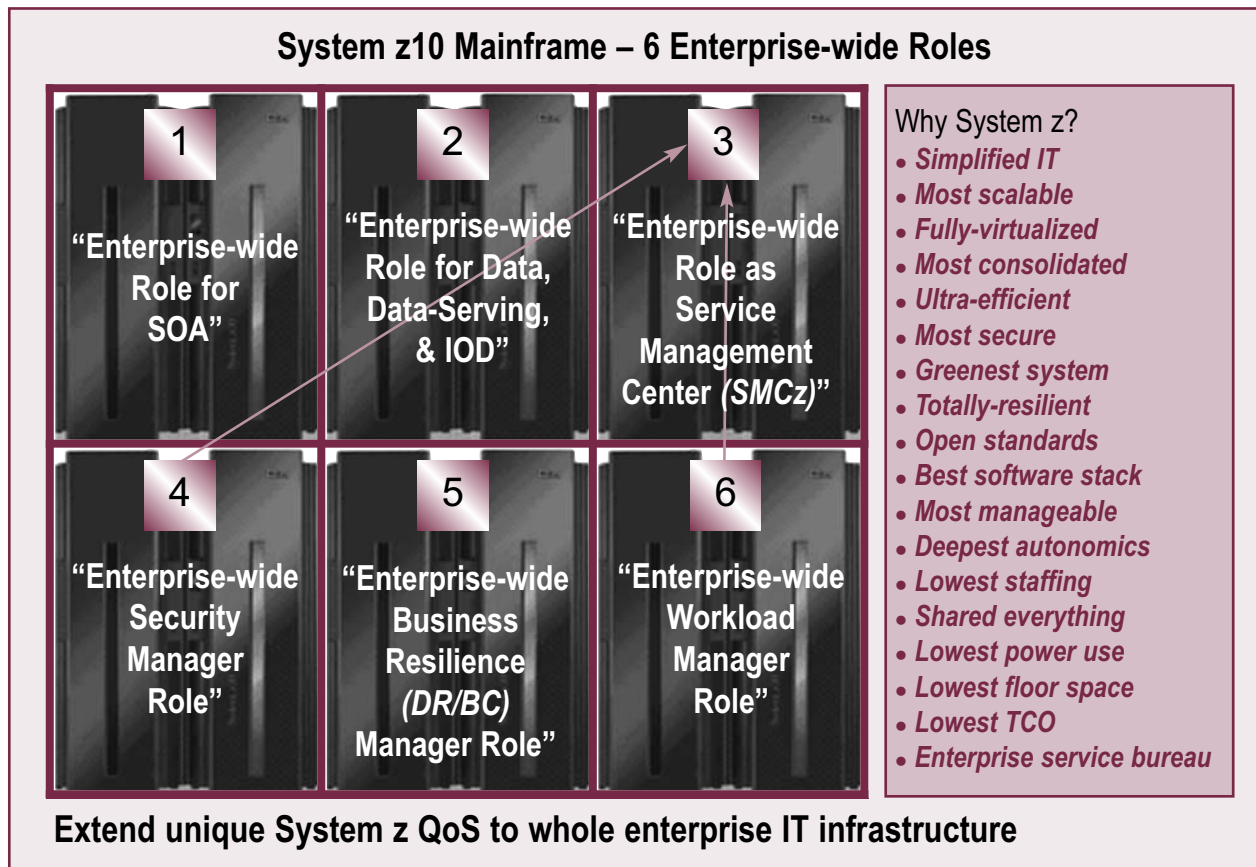


Figure 6: System z10 Mainframe – 6 Major Enterprise-wide Roles

The six main new enterprise-wide roles IBM has now firmly targeted and addressed under this strategy to date are shown in Figure 6 (on the previous page 19). Readers will readily appreciate how the already-deep mainframe strengths/goodness (shown on the right of Figure 6) would bring substantial extra business value in these roles when applied to other IT platforms/whole infrastructures, as well as on System z itself. Since 2004, IBM has innovated, developed and delivered scores of additional new System z hardware, software and tooling capabilities. These now provide increasingly comprehensive System z support for each of the important newer roles and this development process continues.

Indeed, the first three roles shown in Figure 6 are the three main strategic directions IBM has invested most heavily in, and is emphasizing most for substantial mainframe business, workloads, software, and services, growth expected through 2008 and 2009. Indeed, the new SMCz role role (#3 - top right) launched in 2008, now incorporates, extends, and now more fully delivers on, the roles of Enterprise-wide Security Manager (# 4- bottom left), and Enterprise-wide Workload Manager (# 6 - bottom left), that IBM first mooted for System z back in 2006.

Amplifying just one example illustrates how this continuing major effort has evolved. The "Enterprise-wide role for Data" above includes, but also now greatly extends, the traditional heavyweight DB2 (and IMS DB) mainframe data-serving capability long provided to other client applications/platforms from these host subsystems. Now, System z also provides extensive, additional support to off-mainframe client applications running on other platforms, and for XML data as well as relational data (with DB2 V9 "Viper" for z/OS). This now exploits the zIIP specialty processor engine for DB2 & XML workloads, making System z DB2 data serving across the enterprise for other client applications highly cost-effective. This has also enabled a new generation of real-time BI and dynamic DW workloads to be cost-effectively run on System z.

Over the last two years, IBM has rolled out its impressive and comprehensive **Information On Demand (IOD)** offering portfolio, with System z at its center. This included the impressive **IBM Information Server for System z Linux**, powerful new enterprise data integration and transformation software that is an essential foundation for enterprise-wide information delivery on demand, a vital and IBM-unique, SOA complementary capability. Most recently, IBM's \$5B Cognos acquisition completed this impressive IBM IOD portfolio, and has now delivered the class-leading IBM Cognos 8 BI/DW tools suite for the System z mainframe platform; a hugely important advance. This welcome availability of leadership IBM Cognos 8 BI/EPM software on System z (a core aspect of IBM's IOD strategy), is underpinned and enabled by the major database advances that IBM achieved in DB2 for z/OS V9.1. This delivered the first full native XML support (alongside its established SQL strengths), together with numerous other performance and capability advances, extending the already-strong mainframe DB2 data-serving capability by a major leap ahead of IBM's database competitors. DB2 for z/OS V9.1, combined with dedicated zIIP specialty processors, now deliver lower-cost, high-function, mainframe DB2 data-serving, providing an ideal dynamic, real-time data warehousing platform, from which the Cognos 8 tools can now report directly. (See page 81, item 4 for more information.)

## System z Now Mostly Lowest-cost, Always-greenest Enterprise IT Platform

Capacity/throughput doubled for each previous System z mainframe generation, and has now jumped by 70% on the new System z10 EC high-end mainframe generation (discussed below) that shipped from February 26<sup>th</sup> 2008. Sharp hardware cost reductions averaging 20% per annum (p.a.), and software cost drops averaging 17% p.a. since 1997, plus many other cost improvements, combined to yield over 30% total mainframe price/performance gains per year. Adding to these large mainframe economic advances were:

- **Superb virtualization/automated workload management** that enables up to nearly 100% utilization of capacity.
- **Full slate of Capacity on Demand (CoD) options**, for greatest customer flexibility to meet varying workload needs, now with "Just In Time" (JIT) CoD.
- **Highest levels of systems automation**, that has slashed support staff needed, now multi-fold lower than on distributed platforms, and far lower than on pre-2000 mainframes.
- **Smallest data center footprint, lowest power and cooling costs**, per enterprise workload and/or per 1000 users, all three now large, fast-rising enterprise IT costs, and often now also major IT constraints.

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*These factors now make the mainframe the leanest and greenest of enterprise IT platforms per workload metric, including large environment savings...*

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Today's System z mainframes deliver the lowest TCO/Total Cost Per User/Cost-Per-Transaction for medium/large mixed commercial workloads (both traditional and new – the latter now including extreme virtual server hosting), when well utilized. Much higher resource utilization, much lower support staffing, many fewer software licenses, lower networking costs, vastly

lower electrical power and cooling needed, and far less data center floor space costs, account for the 30-50% lower TCO System z solutions now routinely deliver, versus Wintel/UNIX distributed system alternatives of comparable capacity. These factors now make the mainframe the leanest and greenest of enterprise IT platforms per workload metric, including large environment savings (electrical power, cooling energy, and data center floor space) within their overall large advantage.

## System z9 Generation Extended Success

IBM drove a heavy drumbeat of major advances in mainframe server and storage hardware, economics, operating, middleware, and tools software over the last three years with the previous System z9 mainframe generation. We deeply assessed these in several studies (see page 81, items 9 & 12) and we recap their highlights here as:

- **System z9 BC:** Entry-midrange, ideal for medium business, from only \$100K, at 26-1,786 MIPS capacity. (*Succeeded z890 system.*) Continues in mid-2008 as IBM's mid-range mainframe offering, until an expected new "z10 BC" is introduced.
- **System z9 EC:** High-end systems, ideal for larger enterprises, 5 models, <54-Way Central Processor (CP), <17,800 MIPS capacity. (*Succeeded z9 109, & prior generation z990.*) Now succeeded in turn by the new System z10 EC.
- **Industry-first 4Gbps FICON I/O supports,** for higher input/output performance/capacity on all z9s.
- **New zIIP:** New specialty processor for low-cost DB2 data serving, on all z9s (*see above*).
- **Unique "Hybrid Processor" Architecture:** Combines standard, general-purpose mainframe processors (CPs), with the specialty workload processors IFL (*Linux*), zIIPs (*DB2*), zAAPs (*Java*), and ICFs (*Sysplex cluster coupling*), plus spare Processor Units (PUs), System Assist PU's (I/O), massed I/O channel microprocessors (MPUs), plus cryptographic card MPUs. All these processors create unique "commercial supercomputers" of huge (*up to 416 processors total on the z9 EC*), and cost-effective capacity in a small footprint. (*Continued, with further advances, in the System z10 generation.*)
- **Superb Virtualization/Automated Workload Management:** Enabling near-100% capacity/resource utilization across multiple, mixed workloads, traditional and new.
- **Fulllest CoD Options:** For maximum flexibility so that customers can rapidly meet their varying workload peaks.
- **New Enterprise-wide Roles for the Mainframe:** Extensive, additional support delivered apace for six new roles. (*See Figure 6 above.*)
- **Leadership Mainframe Storage:** IBM's winning storage portfolio was fully refreshed (*last in early 2008*) with leadership DS8300/DS8100 Turbo high-end, and DS6000 mid-range, disk systems. Numerous other enterprise storage virtualization, System z Disaster Recovery (DR)/Business Continuity (BC), and Sysplex software gains, all optimized for use with the System z platform, were shipped.


The System z9 generation did well in the market from late 2005 to date, further extending the platform's resurgence, installed base capacity, and adding useful new mainframe footprints. Only late in 2007 did System z9 sales dip, as is usual before next-generation mainframes arrive – as the System z10 EC did in February 2008.

## System z10 Debuts February 2008 – Massive Further Advance

The next-generation System z10 EC high-end mainframes (*five-model range*) were announced on, and shipped from, February 26<sup>th</sup> 2008, with an impressive specification of much greater than usual inter-generation advance over its System z9 EC predecessors. These powerful new mainframes are pictured, and our overview of its principal capabilities is summarized, in Figure 7 on page 22. Brief assessment comments are also given below. A few months prior to the System z10 launch, IBM had previously showed off (*to system analysts – including this author*) details of the storming, new IBM quad-core MPU (*and related Symmetric Multiprocessing (SMP) Hub*) chips that now power the new z10 EC mainframes, and which enable and power their impressive advances. System z10 EC highlights include:

- **System z10's Large Capacity/Performance Advance:** Maximum capacity of the top System z 10 (*E64 – 64-Way*) is 70% higher than on the top z9 EC (*S54 – 54-Way*). The increase in z10 capacity at each N-Way level averages 50% over the z9 of the same N-Way processor count. The z10 uniprocessor system itself offers 62% higher performance than the z9 EC uniprocessor. These major z10 capacity/performance advances hugely increase available high-end scale, capacity and performance, enabled by the impressive chip and system advances IBM had incorporated.
- **Spectacular New IBM MPU Powers System z10:** Massively powerful, 4.4GHz. ultra-high frequency, quad-core System z10 processor chips, each packing 991M transistors (*and running at 2.59-times higher frequency than the 1.7 GHz. z9 EC processor chips that delivered 580 MIPS/core*). The high-end chips in the System z10 EC deliver close to 940 MIPS/core, we estimate. (*IBM has again "abolished" MIPS with the z10, for its usual reasons – forlorn hope.*)
- **35% Price/Performance Gains:** Continuing this decade's striking mainframe price/performance gain, the new System z10 EC line again delivers a broad, c. 35% hardware/software price/performance advance, significantly further improving its value, and already leadership TCO when fully loaded and utilized.
- **Massive Chip Bandwidth:** Each z10 chip provides 2\*48 GB/s links to the new SMP Hub chips (*see below*), 4\*13 GB/s links to memory, and 2\*17 GB/s links to I/O, for a massive 182GB/s total chip bandwidth. This is a crucial foundation for the huge throughput, performance and capacity top-end System z10 EC machines using these high-bandwidth chips can deliver.
- **Continues System z Complex Instruction Set Computer (CISC) MPU Line:** The z10 MPU (*and the System z10 line*) continues the tradition of System z "extreme-CISC" Instruction Set Architectures (ISAs). Each core sports a now-894-instruction ISA (*50 new in the z10, 668 implemented all in hardware*), and offers IBM's usual full backward compatibility for all prior mainframe software, addressing modes, and supported operating systems.

## System z10 Enterprise Class High-end Mainframe Storms in Stunning Advances With Near-UNIX Performance Levels!



**IBM System z  
z10 EC**

**Machine Type:  
2097**

**Operating Systems:**  
z/OS, z/VM, z/VSE, TPF,  
z/TPF, zLinux.

**5 Models:**  
E12, E26, E40, E56, E64.  
100 cap. settings on E12.

**Massive Scalability, Capacity:**  
<64-way Symmetric  
Multiprocessing (SMP),  
1.7X capacity\*, 3X memory\*,  
<30,250 MIPS, 1-4 books.

**Stunning z10 MPU Performance:**  
Quad-core, 4.4 GHz. ~2.56X\*,  
3MB L2/core, 991M transistors,  
on-chip cryptographic, data  
compression,  
Decimal Floating Point -X10\*,  
182GB/s chip bandwidth,  
Close POWER6 sibling.

**Great Processor Flexibility:**  
<77 total Processor Units (PUs), <64  
General Purpose Processors (GP) SMP,  
<11 SAPs, 2 spare PUs. PUs can be  
CPs, IFLs, ICFs, zIIPs, or zAAPs.  
Each PU = c. 940 MIPS X1.6\*.

**Strongest System/  
Workload Management:**  
Optimised cross-application & cross  
LPAR, policy-driven workload  
management. Smoothly runs mixed  
workloads <100%.

**Superb, World-class Enhanced  
Middleware & Tool Software:**  
Service Management Center for System z,  
Smart SOA, IOD, & AD/EM tooling.

**“Gold Standard” Virtualization:**  
<60 logical partitions (LPARs),  
<64 CPs /LPAR SMP.  
Virtualized CPUs, I/O, Memory, Net. Runs  
2X more z/VM virtual servers\*  
<4 Logical Channel Sub-Systems,  
HiperDispatch\*.

**Major Price/Performance  
Advances:**  
c. 35-40% TCO savings\*. c 20%  
hardware, <20% on software\*.

**Widest Capacity On Demand  
(COD) Range:**  
Plus new “Just In Time” COD.

**Massive Input/Output (I/O)  
Capability:**  
<1,024 Input/Output channels,  
<48 6GBps InfiniBand I/O interconnects\*  
X2.2\*, 6GBps InfiniBand Coupling Links.

\* = Comparisons with z9 EC S54

IFL, ICF, zIIP, zAAP = Specialty System z workload processors

Figure 7: IBM System z10 Enterprise Class High-end Mainframe Storms in – Stunning Advances

- **Close Sibling to IBM POWER6:** The System z10 processor chip is a close sibling (*but far from an identical twin*) that shares semiconductor technology (*IBM 65 n.m. Silicon-On-Insulator process*), considerable DNA, and also some on-die components, with IBM's winning POWER6 Reduced Instruction Set Computer (RISC) chip that debuted in 2007. IBM's high-performance, dual-core, high-frequency POWER6 RISC chips power IBM's shipping System p, System i, and some IBM BladeCenter servers, and are much the highest-performing server processor on the market. However, contrary to widespread convergence rumors, the two processors remain distinct, each optimized for their different roles, whilst fully exploiting the above commonalities.
- **Optimized for Mainframe Roles/Workloads:** The System z10 MPU was heavily optimized for mainframe enterprise applications, data-serving, and extreme virtualization consolidator, roles. It included established on-die virtualization, cryptographic acceleration, and data compression hardware support, adding new, on-chip Decimal Floating-Point arithmetic (*“money math”*) the latter over 10X faster than running such calculations via software, as competitor's systems all must.
- **SMP Hub Companion Chip:** Massive new 1.6B transistor SMP Hub companion chips connect to multiple IBM z10 processor chips, with 48GB/s bandwidth per processor, giving access to 24MB of shared L3 Static Random Access Memory (SRAM) cache/SMP Hub, or 48MB of shared L3 SRAM when Hubs are paired. Low-latency cache coherence, robust SMP scaling, and extended SMP scaling when multiple SMB Hub chip/pairs that exploits these SMP Hub chips are used.
- **High-Bandwidth InfiniBand I/O and Cluster Coupling:** IBM has moved the System z10 up to open industry-standard InfiniBand high-performance interconnect technology, for both I/O, and for Parallel Sysplex cluster coupling. The z10 can now support up to 48 6GBps InfiniBand I/O interconnects, replacing the 2.7GBps IBM-proprietary Sony-Toshiba-IBM (STI) interconnects used previously on the System z9. This gives the z10 EC a massive, up to 288GBps, of I/O bandwidth, as well as sharp interconnect price/performance gains.
- **Industry's Most Extensive Reliability, Availability, and Serviceability (RAS):** The z10 was engineered with much the industry's highest levels of on-chip and on-system in-built error-checking and recovery hardware (*extensively supported by the System z10 software*). These together deliver the highest levels of RAS for any general-purpose commercial server that these mainframes again provide.

- **Value Improvements at Each Capacity Points:** These new-generation System z10 EC mainframes need fewer cores, fewer z10 chips (*quad-core*), fewer Multi-Chip-Modules, and fewer books, for any given capacity level, enabling significantly improved value throughout their capacity range.
- **Higher Top-end System z10 EC Capacity:** Top-end System z10 EC capacity increased by 70%, within a near-identical, physical footprint, over the z9 EC. Much faster z10 chip cores, new SMP Hub chips with their new star L2 cache interconnect, and increased SMP scaling (*from prior maximum 54 CP/64 PUs on the z9 EC S54*) up to 64 CP/77 PUs (*on the z10 EC E64*), delivered this substantial capacity gain. Maximum memory was also tripled to 1.5TB, and the much faster 6.0GBps InfiniBand interconnects replaced the prior-generation 2.7GBps IBM STI proprietary interconnects, for hugely increased z10 EC I/O bandwidth.
- **\$3.5B z10 Mainframe Generation Investment:** IBM executives report that investments of \$1.5B on hardware, and \$2.0B on software, were needed to bring the z10 platform to market, using 12,000 staff. That IBM again made this huge investment is therefore a good indicator of its high confidence in the business/revenue growth outlook for its flagship server platform over the next several years.
- **Extended “Extreme Virtualization” Capability:** Top-end, new-generation System z10 mainframes can now run up to 800-1,000 significant-sized Linux-on-z/VM virtual servers (*versus up to 450 on a top z9 EC*), encouraging more mass distributed server workload consolidation. Support for triple the memory of the z9 EC, the huge increase in processing capacity and I/O bandwidth and new support for up to 64 PUs on an LPAR (*driving z/VM*) enable this large increase. The number of LPARs supported remains at 60, ample for any z10 user.

Lastly, but most importantly in this Paper’s System z software context, along with the new System z10 mainframe generation and over the first half of 2008, IBM has rolled out the most substantial and important advances to its mainframe software portfolio in the entire 44-years of mainframe history. These huge software advances are focused in four major, closely linked areas, which are shown in Figure 8.

Each box in the center of Figure 8 highlights the name of each major initiative, with the IBM Software brand-group responsible shown above this, and the software technology platform used shown below. Our strategic positioning description of each initiative is shown to the side, and their closer fit to the new System z10 environment is indicated by the points made above and below.

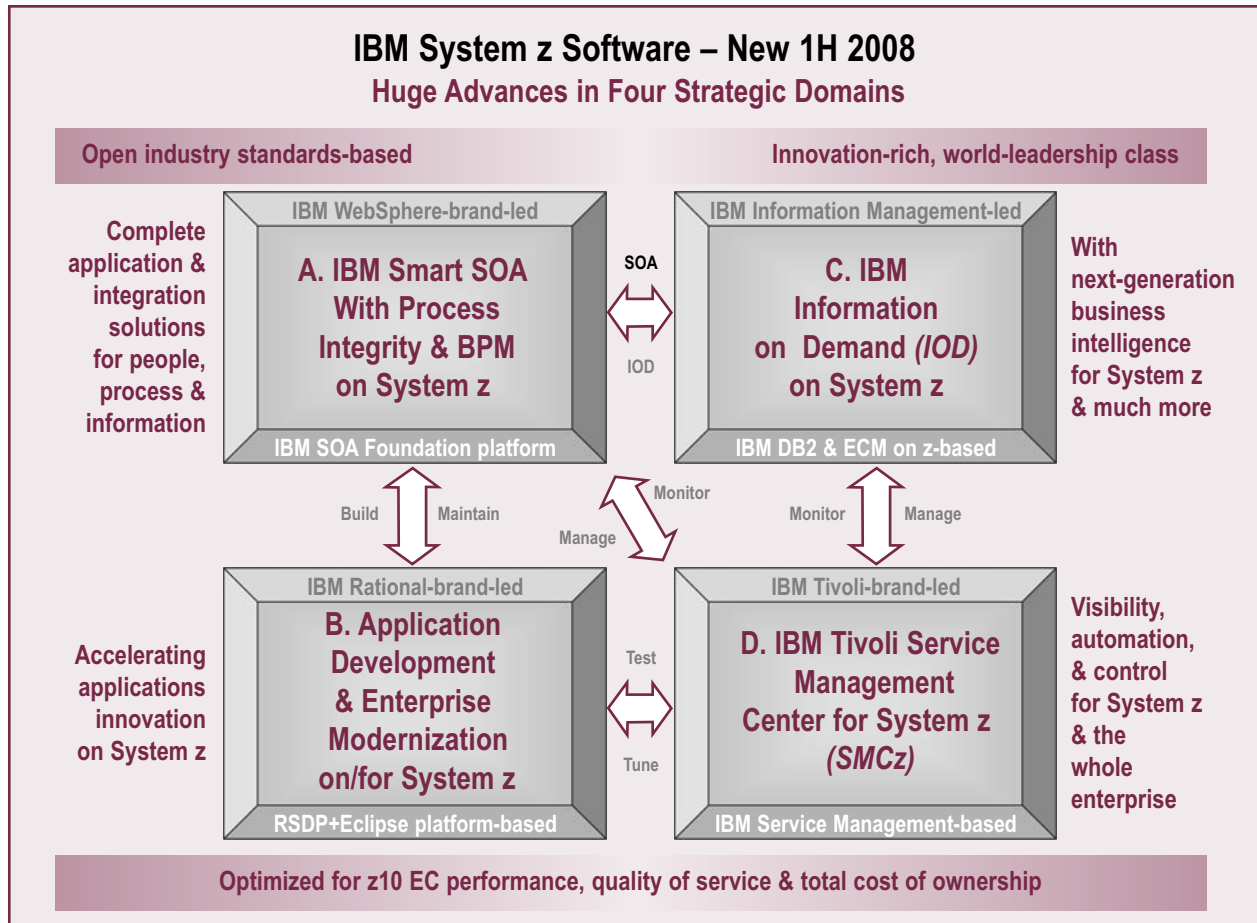


Figure 8: IBM System z Software – New 1H 2008 – Big Advances in Four Strategic Domains

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*...this major mainframe hardware advance, and especially these strategic new IBM z software domains, will spark thousands of new System z10 sales and upgrades from 2008 to 2010.*

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Initiatives A. “Smart SOA” and B. “Application Development/Enterprise Modernization” on System z are briefly introduced in the subsection below. Initiative C, “Information on Demand” on System z, is also briefly introduced in another subsection below. We have recently published major, in-depth studies on both these topics, again referenced below.

The fourth of these strategic System z software initiatives, “**IBM Tivoli Service Management Center for System z**” (SMCz), is the central focus of this present White Paper.

We expect this major mainframe hardware advance, and especially these strategic new IBM z software domains, will spark thousands of new System z10 sales and upgrades from 2008 to 2010.

## **System z10 Performance Near-equals Best UNIX Servers**

From about 1997, top UNIX system raw performance raced ahead of IBM mainframes (*despite many advances in the latter*) at lower hardware costs. Whilst far behind the sophistication, refinement, efficiency, and superior service qualities of mainframes, such UNIX systems offered more “raw bang-for-the-buck”, and were often rated “good enough” technology.

Important new enterprise applications and middleware software was first written for, and then widely deployed on, such larger UNIX systems through the late 1990s. Sun Microsystems, the early leader, lost its lead to HP. IBM next overtook both to become the clear UNIX market-share leader from 2005 onwards. IBM’s POWER-processor-based System p servers have consistently dominated UNIX performance (*and price/performance*) benchmark rankings, far outdistancing all competitors since their 2001 debut. The current POWER6 microprocessor-based System p continued this winning IBM UNIX tradition from mid-2007. Today, most other RISC-UNIX server architectures are now either dead, or struggling, as a result. To date, Intel’s much-hyped but serially underselling, niche high-end, full-64-bit, server processor – the Itanium (IA64) line – has also remained far behind POWER’s performance at each generation cycle.

However, IBM also steadily drove down System z hardware and software costs to now highly-competitive levels, when their exceptionally high utilization, low staff, and other high-QoS benefits, are factored in fairly to the complete TCO equation.

With the System z10 mainframe, IBM has made unprecedented advances in the z10’s quad-core microprocessor and system architecture, delivering the largest-ever jump in performance for any new mainframe generation. New System z10 EC performance/capacity now comes close to that of the best high-end UNIX system design today; IBM’s POWER6-based System p servers. This huge System z10 performance advance, plus further solid price/performance gains, now allows many more workloads (*in the past run on UNIX*) to run superbly well, and affordably, on System z10 mainframes.

## **System z – Top SOA Applications Platform**

SOA is without question the most important application software architecture advance in our industry’s history. SOA has rightly enjoyed soaring customer adoption over the last four years. System z mainframes already host an estimated \$3Ts-worth (*and up to 44-years*) of business-critical applications assets, and 90% of the world’s largest commercial databases, on c. 15,000 mainframe systems at over 10,000 customer enterprises. These System z-resident application and data assets are a crucial basis for SOA enhancement/extension/reuse and new exploitation.

Today’s System z mainframes, combined with the now-outstanding, comprehensive, and industry-leading IBM Smart SOA System z middleware/tools software, offers an unequalled, enterprise SOA hosting environment. Close to 1500 IBM mainframe users have already based their firm’s SOA adoption upon their System z, and on this IBM Smart SOA software. The combination provides the ideal enterprise “SOA Central” host for their new, mission-critical business processes and the new SOA applications supporting them, providing the unique System z platform QoS that are essential for these vital, high-transaction-volume, core business solutions. Closely associated with “Smart SOA”, which provides the runtime infrastructure for SOA applications, IBM has completed major advances in the application development and enterprise modernization tooling portfolio for System z that provides extensive support for building new SOA applications, and for reusing and modernizing exiting system z assets. See our in-depth new Smart SOA on System z White Paper for full analysis of both these crucial IBM mainframe software initiatives (*on page 81, item 1*).

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*Today’s System z mainframes, combined with the now-outstanding, comprehensive, and industry-leading IBM Smart SOA System z middleware/tools software, offers an unequalled, enterprise SOA hosting environment.*

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## System z Central to IBM's IOD, Complements SOA

**IOD** is IBM's extraordinarily ambitious, grand vision/strategy to bring customers a more all-embracing, new generation of enterprise information management solutions. IOD aims to deliver accurate, consistent information, as-and-when needed (*On Demand*) across the whole enterprise and its business ecosystem. IBM IOD solutions operate over structured data and unstructured content, under an open-standards-based, SOA-supportive software architecture. IBM set IOD overarching goals to optimize, integrate, virtualize, and accelerate enterprise-wide access to, and to enable much faster delivery of, **trusted, reliable, accurate, real-time and dynamic, information** within the correct business context, to all "consumer" applications, business processes, and people across the enterprise and its ecosystem.

This truly impressive, genuinely visionary, IBM IOD strategy was first publicly announced in February 2006, when the initial IOD product and service offerings began shipping. Now, just two years later, after 25 IBM IOD ISV acquisitions have been folded in as part of an extraordinary \$15B of cumulative IOD investments made, IBM's IOD products and industry solutions portfolios are now comprehensive, and customer uptake is soaring. The System z mainframe features center-stage in the IOD offerings set. The major IOD software (*plus solutions and services*) that enable the mainframe to serve as the enterprise-wide IOD hub platform are now available in mid-2008.

IOD is closely related to, is highly supportive of, and is technically integrated with, IBM's Smart SOA initiative, delivering the "information services" capabilities of IBM's SOA Reference Architecture. See our in-depth, new IOD on System z White Paper for our full analysis (*details on page 81, item 4*).

## Our Analysis – Mainframe's Wide Success Extended

The IBM System z mainframe at mid-2008 is in robust health, enjoying an expanding resurgence, and successfully attracting a mass of new-to-mainframe, high-growth workloads onto the platform this decade. The new System z10 mainframe generation will further boost this success. The pace and breadth of mainframe innovation and advancement over the entire hardware and software stack, fuelled by massive ongoing IBM investments, far exceeded that of other major platforms. Relative competitive platform advantage has now swung strongly back in favor of the far more efficient, shared resource, centralized, "all-in-one-box" IBM mainframe computing model. Enterprise users are increasingly desperate to escape from their legacy scale-out distributed computing infrastructures, fashionable until earlier this decade, but now widely despised as a profligate, wasteful and unmanageable IT platform.

Specialty processor engines made System z highly attractive and cost-effective for customers valuing efficient, lean-and-green, centralized computing, encouraging users to bring major new workloads onto mainframes. These are an important part of today's mainframe's hybrid-processor, "commercial-supercomputer" model. This blends several types of optimized, dedicated processors to best handle massive overall mainframe workloads. The previous System z9 (*9<sup>th</sup> CMOS mainframe*) generation proved highly successful for IBM from its 2005 first debut. These systems extended mainframe capacity and capability, further sharply improved their economics, won thousands of enlarged base footprints, and added hundreds of all-new customers to the base. They also supported and exploited the richer and deeper System z software infrastructure of subsystems, middleware, and tools that now includes the industry's strongest SOA stack (*our recent assessment*).

Enterprise IT user adoption of SOA has exploded rapidly from 2005-2008, and is fast becoming the universal business application software architecture, with the mainframe serving as "SOA Central" for many. Many large SOA adopters now rely upon their mainframes to host enterprise-wide SOA composite applications that exploit, reuse, extend and modernize their wealth of mainframe application software, transaction, and database assets. Managing, monitoring, securing, and optimizing these more complex, new mainframe-based and SOA technology-enabled, critical business processes has thus become vitally important.

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*...the spectacular new IBM z10-quad-core MPU brings further radical advances in mainframe capacity and scaling, business value, and green IT advantages.*

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The new generation of System z10 EC mainframes, powered by the spectacular new IBM z10-quad-core MPU, that became available from February 26<sup>th</sup> 2008, brings further radical advances in mainframe capacity and scaling, business value, and green IT advantages. These new mainframes will certainly further accelerate the already substantial market and workloads swing-back to this ultra-virtualized, and extraordinarily efficient, platform.

The System z ecosystem of business partners, ISVs and their mainframe software products palettes, System Integrators (*SIs*), and Service Providers (*SPs*), has continued to expand, growing once again in a healthy fashion in-line with platform resurgence, aided by continued IBM ecosystem-building investments.

With burgeoning new mainframe workloads driving high capacity growth at most sites, and the thriving, healthy System z ecosystem above, mainframe customers need improved service management capabilities, both to efficiently manage fast z platform business services growth, and also to bring mainframe quality to their wider Enterprise Service Management (ESM).

IBM Tivoli made major new investments into its ISM strategy, into an extensive portfolio of operational and financial management tools for the System z environment itself, as well into tools for enterprise-wide management. This was hugely beneficial to System z users. Over recent years, IBM Tivoli also greatly accelerated enhancement and extension of its operational system management tools portfolio that help mainframe users easily, and efficiently, manage and optimize their mainframe servers, storage, applications workloads, user bases and security, assets, and IT financial management (*such as in resource usage accounting/chargeback*).

## 4. Managing in, From System z Environments – IBM Tivoli Offerings Now Strong

### Introduction

The resurgent System z's market growth, its burgeoning new workloads, transformed economics, new enterprise-wide roles, the large hardware leap from the z9 to the new z10 generation, have hugely extended mainframe usage. Especially driving this expansion of usage has been the now-wider and deeper mainframe software stack, especially for Service Oriented Architecture (SOA), Information On Demand (IOD), & IBM Tivoli Service Management Center for System z (SMCz) (*all discussed in Section 3*). Such extended usage demanded matching system management advances, in the form of more sophisticated system management software, to help users manage all aspects of monitoring, operating, securing, scheduling, and optimizing their now highly-virtualized System z environments and new workloads.

In recent years, IBM Tivoli and IBM System z have aggressively addressed these more demanding, modern mainframe system and storage management needs. IBM Systems shipped major advances/developments to its base server systems and storage platform management suites for System z (*see Appendices A & B of this White Paper*). IBM Tivoli greatly extended and broadened its IBM Tivoli operational management software for System z, through a powerful combination of major Independent Software Vendor (ISV) acquisitions, and large investments in accelerated in-house developments. The result was that big advances in the IBM Tivoli operational management software portfolio for System z were delivered through to mid-2008, extending the portfolio in leaps and bounds to meet extended System z management needs across all system management areas.

In addition, many mainframe customers have long wanted to extend their mainframe's more robust, more rigorous management capabilities to also oversee and manage the workloads run across their scattered, distributed platforms, long far more challenging and more costly to support and manage. Many users also observed this decade's industry developments in business/IT Service Management (ITSM), with the emergence and adoption of widely-recognized best practice frameworks. These include the leading Information Technology Infrastructure Library (ITIL) framework, and offer considerable further potential Enterprise Service Management (ESM) benefits.

**IBM Tivoli SMCz** was launched in late May 2008, after being IBM's premier software announcement at the February 2008 System z10 EC new mainframe launch three months before. With SMCz, IBM decisively addressed enterprise IT/mainframe user's broad service management requirements, with this major new strategic business service management offering. We introduce and assess SMCz in detail in Sections 6 and 7, and Appendix C.

The greatly extended, heavily updated, now-wide-ranging and complementary IBM Tivoli portfolio of System z operational management and IT financial management solutions now provide powerful underpinnings for SMCz. These were augmented by ISV acquisition of high-function service and asset management/process automation capabilities that are now the heart of its ITSM strategy, now called IBM Service Management (ISM) – overviewed in Section 5 following.

### Big System z Middleware Advances – Software Stack Best Ever

Enabling the burgeoning new (*and traditional*) mainframe workloads shown in Figure 5 on page 18, IBM today offers a comprehensive suite of leading-edge, foundation System z middleware (*for both z/OS & Linux*) that underwent rapid, major advance/extension. The System z's middleware software subsystems, including: DB2, Information Management System (IMS), CICS, WebSphere Application Server (WAS) and the Smart SOA suite, WebSphere MQ, NetView, IBM Systems Director, and the IBM Tivoli System z portfolio, etc., saw further unprecedented rates of advance over the 2004 through 2008 period. An extensive, new and enhanced Rational applications and team development, and enterprise modernization, tooling software portfolio for System z has also been completed by early 2008.

These major developments were focused on deep extension of the core System z middleware software servers to fully embrace Java Enterprise Edition™ (*Java EE™*), support open standards/Web services, to embrace and fully support “Smart SOA”, and to add support for IOD. These large IBM System z software investments, plus numerous ISV acquisitions, complemented by major mainframe operating system advances, now in mid-2008, sees IBM’s mainframe software stack by far its strongest, most comprehensive, and at the most advanced level in the platform’s history. It reached this high point by mid-2008, with IBM’s completion of the rollouts of four major System z strategic software domains, shown in Figure 8 and discussed nearby, and which included IBM Tivoli SMCz.

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*...mid-2008, sees IBM’s mainframe software stack by far its strongest, and at the most advanced level in the platform’s history.*

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Mainframe customers today are upgrading to new IBM middleware engine/subsystem releases considerably faster; both to enable their new SOA development projects, and also to fully exploit the mainframe hardware and operating system advances that these releases also support more briskly. The world-class new/enhanced System z middleware introduced radically extended the scope and capability of the platform. We expect to see large-scale customer uptake of these offerings over the next several years. Including, for example, the IBM WebSphere Process Server (*Smart SOA*), the IBM InfoSphere Master Data Management Server, the IBM Information Server, and the IBM Cognos 8 Business Intelligence (*BI*)/Enterprise Performance Management (*EPM*) solution – the latter three all IOD offerings. The runtime middleware engines, often termed “mainframe subsystems”, all need to be operationally managed as crucial resources (*see below*). With this extensive range, and much faster pace, of mainframe subsystem advance, the requirements and demands for their enhanced system management also became far more stringent and faster advancing too.

## Mainframe “Subsystems View” – What Must We Manage on System z?

The System z mainframe evolved a rich, mature, and extensive infrastructure of runtime software/hardware environments (*operating systems, major subsystems/middleware servers, and hardware management, etc.*) that today provides sound foundations for both traditional and new-generation mainframe application workloads. One helpful way to consider what needs to be monitored, managed, secured, and optimized at a System z user site is the “mainframe subsystems view” below:

- **z/OS.**
- **z/VM.**
- **z/VSE.**
- **z/TPF.**
- **zLinux (SLES and RHEL).**
- **DB2 for z/OS, Linux.**
- **IMS for z/OS.**
- **CICS on z/OS, VS/E.**
- **WebSphere Application Server (WAS) on z/OS, zLinux.**
- **WebSphere Process Server (WPS) on z/OS, zLinux.**
- **Unix System Services (USS) on z/OS.**
- **WebSphere MQ (WMQ) on z/OS, zLinux.**
- **TCP/IP, SNA-NetView on z/OS.**
- **RACF on z/OS, z/VM.**
- **Specialty Processor Engines.**
- **System z Storage.**
- **Parallel Sysplex Clusters.**
- **GDPS (Geographically-Dispersed Parallel Sysplex) Clusters.**

We interpreted the term “subsystem” broadly for this list. Naturally, most customers will only be using just a subset of these. Each mainframe subsystem resource individually (*at the least*) needs to be monitored, managed, resourced, performance-tuned, and troubleshot from time-to-time, to ensure it is running at its best.

However, many mainframe and enterprise applications, and now SOA-enabled business (*process*) services, are now actually composite applications run across multiple mainframe subsystems, and often across mainframes and other distributed server platforms. The management of these more complex business process services/composite applications clearly requires additional, higher-level, application layer system and service management capabilities that can manage them end-to-end at the business service level over their entire lifecycle. This vital new role is the target for the new IBM Tivoli SMCz offering portfolio.

## Great Autonomic Computing Progress, Automation Slashed Mainframe Staffing

Over the past decade, IBM incorporated well over one hundred significant autonomic, self-managing and self-optimizing capabilities into its core mainframe subsystems (*and up and down their supporting hardware and software stacks*). These extensive improvements enabled mainframe subsystems to increasingly perform many more needed functions for themselves under autonomic self-guidance, without (*or with much less*) manual intervention. Another hundred-plus similar autonomic advances have also been incorporated, during that decade, into today’s now far-more-extensive IBM Tivoli System z management software portfolio. These included the powerful workload operations automation capabilities that are renowned on the mainframe.

Indeed, in 2007, IBM announced that it would invest a further \$100M in “mainframe simplification” and further automation over five years to further extend/accelerate the extraordinarily large productivity gains these earlier autonomic efforts have already reaped for mainframe customers since the mid-late 1990s. Those developments hugely reduced the operations staff needed to run/support mainframe environments in 2008, to under one-tenth of that needed just a decade before.

Recent 2008 detailed, real customer comparisons now also clearly indicate that medium-to-large mainframe environments can today be managed/supported with between just one-fifth to one-third of the number of staff needed to run the same workloads on equivalent capacity scale-out distributed computing configurations. This huge System z staff productivity advantage came directly as a result from IBM’s sustained, pioneering, across-the-board incorporation of autonomic technologies, and from the extensive management tooling and system automation support IBM had already delivered on the mainframe platform.

These outstanding mainframe operations staff productivity gains, in turn, have provided major Total Cost of Ownership (TCO) savings motivating customers to add large, new workloads onto their System z mainframes, often taking these off far-more-costly-to-run, people-intensive, scale-out distributed platforms. On the latter, staffing costs for support and management are normally the largest cost item, ahead of second-placed software license, subscription and support costs, and third-placed hardware costs, so these wide-margin, mainframe-staff-cost-advantages bring mainframe customers huge operations cost savings.

ISM, delivered via **IBM Tivoli SMCz**, now brings additional advances in ITSM, in the forms of best practices process management, and more advanced business service management automation. This will further extend the already-striking mainframe operational productivity levels and will also enable them to be brought to bear upon business services running over the whole enterprise IT infrastructure; a highly compelling value-proposition.

### Mainframe Management Roles – What IT Staff Types are Involved, Their Need?

Another useful view of the system management challenge faced by typical, larger mainframe customer sites is to consider the IT organization functional groups/units, and the different staff groups/types, found there and that are required to support a robust operations environment. These functions span the diverse roles/tasks needed to manage/run mainframe server(s), storage, software, applications, networks, services, to support the user base, and to handle its financial and asset management. Best defined for mainframe sites, these roles help clarify and define overall enterprise systems management needs.

System z Mainframe Management – Who is Involved, What do They Need Today		
Mainframe Site Functions/Units	Types of Mainframe Personnel Involved	Systems Management Support Needs
Mainframe Service Management	<ul style="list-style-type: none"> <li>• Service Level Managers</li> <li>• Service Desk Personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Service Dashboards</li> <li>• Service Catalog</li> <li>• Service Request Management</li> <li>• Service Discovery</li> <li>• Process Managers</li> <li>• Best Practices</li> </ul>
Mainframe IT Financial Management	<ul style="list-style-type: none"> <li>• Contract/License Managers</li> <li>• Usage Accounting/Chargeback Staff</li> <li>• IT Asset Management Staff</li> </ul>	<ul style="list-style-type: none"> <li>• IT Asset Management</li> <li>• Software License Management</li> <li>• System Usage, Accounting, Chargeback Billing</li> <li>• IT Contract Management</li> </ul>
Mainframe Operations	<ul style="list-style-type: none"> <li>• Console Operators</li> <li>• Systems Automation Specialists</li> <li>• Centralized Mainframe Event Management Staff</li> </ul>	<ul style="list-style-type: none"> <li>• Operations Dashboard</li> <li>• Remote Control</li> <li>• Workload Scheduling</li> <li>• System Automation</li> <li>• Problem Determination/Resolution</li> <li>• Job Scheduling</li> <li>• System/Server Management</li> </ul>
Production Control	<ul style="list-style-type: none"> <li>• Production Control Managers</li> <li>• Job Schedulers</li> <li>• Output Management Staff</li> <li>• JCL Validation/Control</li> </ul>	<ul style="list-style-type: none"> <li>• SME Workbench</li> <li>• Expert Advice</li> <li>• Performance Monitoring</li> <li>• Capacity Planning</li> <li>• Problem Determination &amp; Administration Tools</li> <li>• Cross Domain Analysis and Reporting</li> <li>• Network Management</li> <li>• Storage Management</li> <li>• Application Management</li> </ul>
Technical Support Services	<ul style="list-style-type: none"> <li>• Systems Programmers</li> <li>• Database Analysts</li> <li>• Application Analysts</li> <li>• Storage Administrators</li> <li>• Network Administrators</li> <li>• Monitoring &amp; Performance Management Experts</li> <li>• Problem Determination Specialists</li> <li>• Capacity Planners</li> </ul>	<ul style="list-style-type: none"> <li>• Identity Management</li> <li>• Compliance Insight</li> <li>• Security Administration</li> <li>• Security Auditing</li> </ul>
Security	<ul style="list-style-type: none"> <li>• Security &amp; Compliance Auditors</li> <li>• Security Administrators</li> </ul>	<ul style="list-style-type: none"> <li>• Identity Management</li> <li>• Compliance Insight</li> <li>• Security Administration</li> <li>• Security Auditing</li> </ul>

Figure 9: System z Mainframe Management – Who is Involved, What do They Need?

Figure 9's first column shows the main organization units found in most mainframe IT shops (*naming may differ*). The second column shows the mainframe job roles normally found in each such unit. The third column shows the broad systems management capabilities that such staff needs in order to carry out their roles in supporting their System z environments today. Mainframe IT organizations were long more structured (*in this way*) than distributed IT shops. With the much-reduced mainframe staffing levels needed today, each actual person now often fulfils more than one role. The huge autonomic and system automation advances (*discussed above*) achieved by IBM across the whole mainframe stack over the last decade, have made today's System z environment far more productive. It now needs only a fraction (*one-tenth to a one-fifth*) of the operations staff headcount per 1,000 MIPS of capacity than were needed 10 years earlier.

## IBM Systems Director – Foundation System z Platform Management

**IBM Systems Director** is the highly-capable, elegant, comprehensive, and unified IBM server-focused manager for physical and virtual platforms that manages servers, storage, and networking equipment, across all IBM Systems server and storage systems, and over major third-party platforms. Today, it supports the System z mainframe server environment with an extensible, modern, Graphical User Interface (*GUI*) tool suite foundation upon which all higher levels of system and enterprise management can be built. IBM Systems Director is described and illustrated in Appendix A of this White Paper. It underpins, integrates into, and feeds system event data to, the extensive IBM Tivoli System z management portfolio. IBM Systems Director's broad baseline functionality is provided inclusively, and at no extra charge, with all IBM Systems server platforms. Optional, additional capabilities can be added for modest license fees, to encourage the widest possible customer exploitation of IBM Systems hardware platforms that this attractive platform management suite facilitates.

## IBM TotalStorage Productivity Center Suite – Storage Management Foundation

IBM Systems Director (*see above*) provides a comprehensive, server-focused management suite for all IBM Systems server platforms (*and for major third-party server platforms*). In a similar manner, the **IBM TotalStorage Productivity Center (ITPC)** suite provides wide-ranging, foundational, storage system management services for all IBM System storage, and leading third-party storage systems, for both physical and virtual storage environments. The ITPC suite is described/illustrated in Appendix B of this Paper.

ITPC also integrates upwards into, and fully supports, the extensive, higher-level IBM Tivoli storage management/System z management portfolio, some mentioned in this White Paper. The base version of ITPC is provided inclusive with each IBM System storage Disk Storage (*DS*), Enterprise Storage Server (*ESS*) and Storage Area Network (*SAN*) Volume Controller (*SVC*) system. The optional additional capabilities ITPC offers can be added at modest license fees, to encourage the widest exploitation of the IBM System Storage hardware.

## IBM Service Management Introduced

On October 6<sup>th</sup> 2006, IBM Tivoli introduced new software, tools, and business partner support under its new ISM strategy. This was designed to help IBM's customers overcome the challenging issues of managing/delivering business services running across complex, multi-platform IT environments (*with their myriad, disparate technologies*) that make it difficult to deliver reliable, end-to-end business services.

IBM Tivoli today now provides a comprehensive set of software offerings that support ISM, which is a scalable and modular approach to the delivery and managements of more effective and efficient business services to the enterprise. This IBM Tivoli service management software enabled all types of enterprise to attain and deliver service excellence to support their business goals, through the close integration and automation of processes, workflows and tasks. Now built around the IBM Tivoli Service Management Platform, the offering includes this highly-secure, open-standards-based, core software platform complemented by the extensive Tivoli range of proactive operational management solution software, extensive IBM services and support, and an active ecosystem community of IBM business partners.

The IBM ISM announcement was based upon, and incorporated, crucial additional software technologies from IBM's MRO Software acquisition (*see next subsection below*) which closed on the same October 2006 date, and from IBM's Consul Risk Management, Inc., and Isogon acquisitions mentioned below. We assess ISM more fully in Section 5.

## MRO Buy Adds Asset Management Strength, Service Management Platform

IBM Tivoli's seminal acquisition of MRO Software brought IBM the well-known, market-leading, and extensive MRO Maximo Enterprise Asset Management (*EAM*) platform and vertical solutions portfolio, now re-named as the IBM Maximo portfolio. These IBM Maximo EAM offerings help enterprises to manage **all their enterprise industrial and commercial (and not just their IT) assets much more effectively**, to gain higher utilization, lower cost, and longer service lives. This reduces asset redundancy and management complexity, ensures higher-quality asset provisioning services are made available to all internal customers, and helps better align technology with business goals.

With many more types of industrial, transportation, and production assets today driven/controlled by digital technologies, many of these types of assets now increasingly resemble IT assets. Managing both types of assets within one single, efficient EAM infrastructure has therefore become increasingly desirable, breaking down these previously separate silos, and improving overall asset utilization and availability.

IBM's collation acquisition provided the advanced application discovery technology. The Micromuse acquisition provided the business service management/real-time dashboards capability. The service request management capability came into the IBM Tivoli fold with the MRO acquisition. These elements, combined and extended, formed the “**IBM Tivoli Service Management Platform**” that powers ISM, and is shared with the IBM Maximo EAM offerings. These are at the heart of IBM's ISM, and the IBM Tivoli SMCz System z platform implementation, with its powerful, enterprise-wide service management capabilities. The MRO acquisition also hugely bootstrapped IBM's hitherto modest, partner-product-enabled service desk efforts, into today's determined, now own-products-based thrust as part of its current ISM drive.

## Our Analysis – IBM Tivoli System Management Portfolio, Strong System z Support

*IBM's Tivoli brand is the world's leading systems management software operation...*

IBM's Tivoli brand is the world's leading systems management software operation, offering an extensive portfolio of advanced, complementary and integrated solutions in all the major areas of enterprise and small-to-medium business systems management. Figure 10 shows the broad range of management solution areas now extensively covered by the IBM Tivoli portfolio today, portrayed here with a slight System z slant.

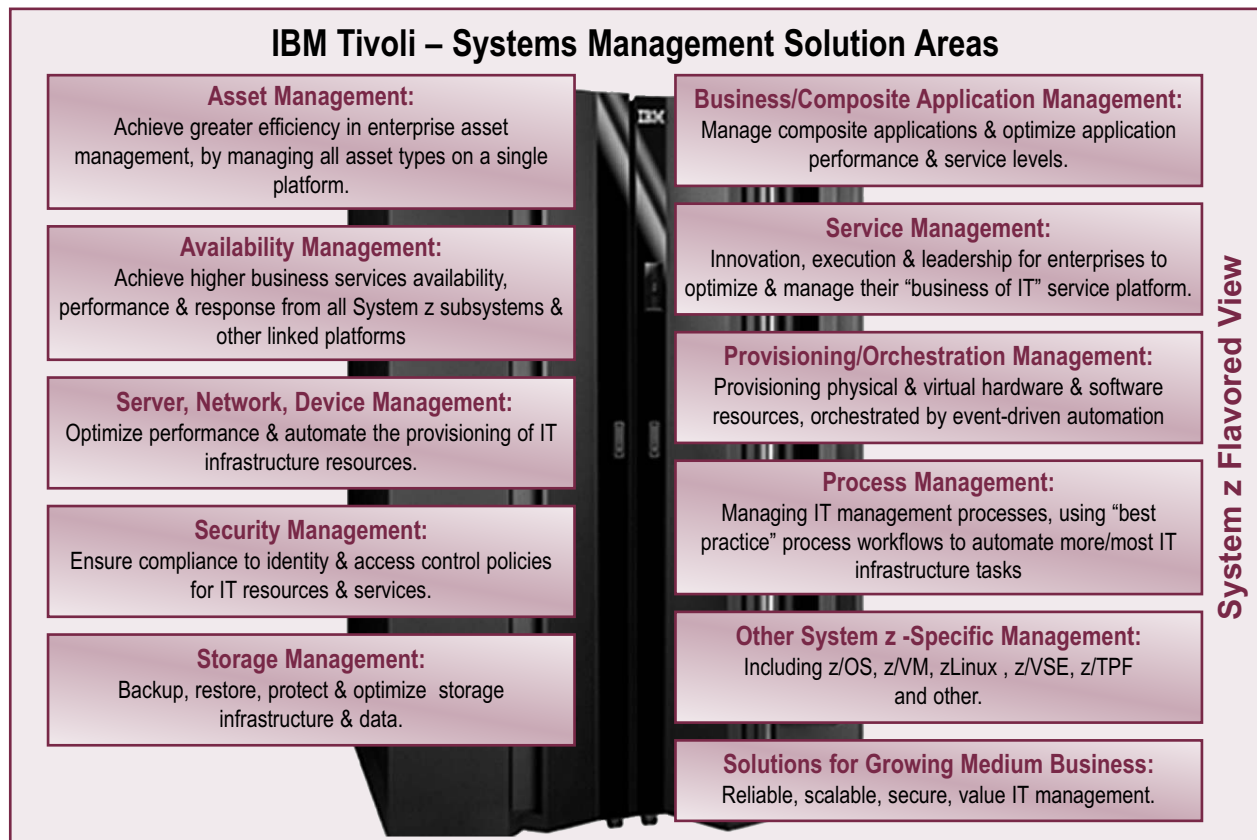


Figure 10: IBM Tivoli – Systems Management Solution Areas

Providing software to support and manage the diverse aspects of the System z mainframe platform became an important part of IBM Tivoli's portfolio and mission in this decade, and after the brand assumed that responsibility it inherited a number of established mainframe management tools (e.g. *IBM Tivoli Netview*).

To support System z's evolving range of new workloads, and its designated new enterprise-wide roles (*both discussed in Section 3*), IBM Tivoli greatly expanded, strengthened, and modernized its System z-related operational system solutions and products in recent years. This was achieved both by major acquisitions of leading (*mainframe*) ISVs/products (*examples of which are outlined below*), and by funding numerous internal software developments. IBM had bought, and integrated into its Software Group, a stunning over 50 different ISV software companies, for a total \$15.8B investment, between 2001 and 2006 alone. Some were small specialist ISVs with excellent technologies, but others were major ISVs worth \$B price tags.

(The latter included: **Rational Software** – application development tools leader – February 2003, \$2.1B; **Ascential** – data integration software leader – \$1.1B; **FileNet** – content management software leader – August 2006, \$1.6B; and **Cognos** – BI software leader – December 2007, \$5B.)

From an IBM Tivoli/System z mainframe-only viewpoint, select acquisition highlights of recent years included:

- **Candle Corporation – OMEGAMON Family:** The April 2004 IBM buy of mainframe performance management leader Candle Corporation brought its extensive, market-generic OMEGAMON Performance Analysis/Performance Monitoring (PA/PM) suite (which covered all major mainframe subsystems) into the IBM Tivoli portfolio. IBM quickly and sharply increased **OMEGAMON XE** suite development investment/resources, delivering faster and broader advances for this iconic mainframe PA/PM family – the traditional market leader. Candle's core technology also provided underpinnings for the new-generation IBM Tivoli Monitoring family, and the IBM Tivoli Enterprise Portal, that are today core foundations for ITSM/ISM, and for SMCz on the System z platform.
- **CIMS Labs, Inc.:** IBM also acquired CIMS Labs, Inc., an ISV whose advanced software helped IT users track their usage of computing resources across modern, virtualized IT environments, and assigned those costs to specific users or organizations, offering a database for tracking, billing, reporting, chargeback, and cost analysis. Today, these capabilities ship in the powerful, segment-leadership **IBM Tivoli Usage and Accounting Manager z/OS Option** product.
- **Micromuse, Inc.:** IBM acquired Micromuse, Inc., in February 2006, adding leadership service provider network management/operations support systems capabilities to the IBM Tivoli portfolio. Micromuse technology helped banks, telecommunications firms, retailers, and government organizations to manage and monitor their complex networks more effectively. Today, the Micromuse-technology-based **IBM Tivoli Netcool** network service management suite helps such service provider users manage any data related to networks and systems service. Micromuse capabilities were also integrated into the new **IBM Tivoli Security Operations Manager** offering.
- **Consul Risk Management, Inc.:** In a December 2006 deal, IBM bought Consul Risk Management Inc., a specialist ISV active in compliance/audit software that helped organizations to track/investigate non-compliant behavior. The firm also provided solutions to simplify administration activities on IBM mainframes. This buy strengthened Tivoli's **ISM and SMCz** initiative, adding important data governance and compliance (including identity access) monitoring, auditing and reporting capabilities across mainframe and distributed environments, a unique capability unmatched by other vendors.
- **Isogon Corporation:** In July 2005, IBM closed the purchase of Isogon Corporation, a leading mainframe software asset management solutions ISV. Isogon technology enabled customers to align software spending with business priorities by automatically tracking inventory, and measuring the usage of software, running on mainframe computers. This technology now plays a central part in the SMCz financial management offerings and in IBM's overall **ISM** strategy (see Section 5 for details).

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*IBM Tivoli has integrated and unified the products from these ISV acquisitions into its burgeoning portfolio rather quickly, and with considerable success.*

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IBM Tivoli has integrated and unified the products from these ISV acquisitions into its burgeoning portfolio rather quickly, and with considerable success. Whilst this process continues, and doubtless a few loose ends can be seen, IBM Tivoli's progress here has, in our view, been remarkable.

## 5. IBM Service Management from Tivoli Introduced

### IBM Service Management (ISM) – An Introduction

In October 2006, IBM first rolled out its vision/strategy for ISM, accompanied by its first major wave of supporting products, solutions, services, and partners. These ISM solutions, according to IBM Tivoli, help IT organizations deliver business service excellence through

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*ISM delivers new levels of visibility, control, and automation across the business service lifecycle needed by innovative businesses to achieve their goals...*

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Advancing IT Service Management (ITSM) by a major leap, ISM delivers new levels of visibility, control, and automation across the business service lifecycle needed by innovative businesses to achieve their goals/objectives.

Specifically, ISM is designed to help its adopters significantly improve business service management in the three vital areas of:

- **Visibility**, which enables organizations to “see” their business more clearly.
- **Control**, which helps organizations to govern their business and optimize their use of assets.
- **Automation**, which enables organizations to optimize their business processes and reduce staff effort.

By improving governance and risk management via such improvements, ISM allows the IT department to set project priorities that better align with business goals, to deliver projects on time or earlier than scheduled, and to meet or exceed service-level targets. By enhancing service quality levels, ISM also helps businesses attain their growth and competitive position-improvement goals. IBM combines best practices and methods, the extensive IBM Tivoli (*and other brand*) software tools portfolios augmented by significant acquisitions and developments, and new IBM professional services, to deliver flexible ISM solutions. A high level view of both the architecture of ISM (*left-hand side of chart*), and of its main core functionality (*right-hand side*), is shown in Figure 11. The right-hand side elements comprise most of the IBM Tivoli Service Management Platform (*ITSMP*).

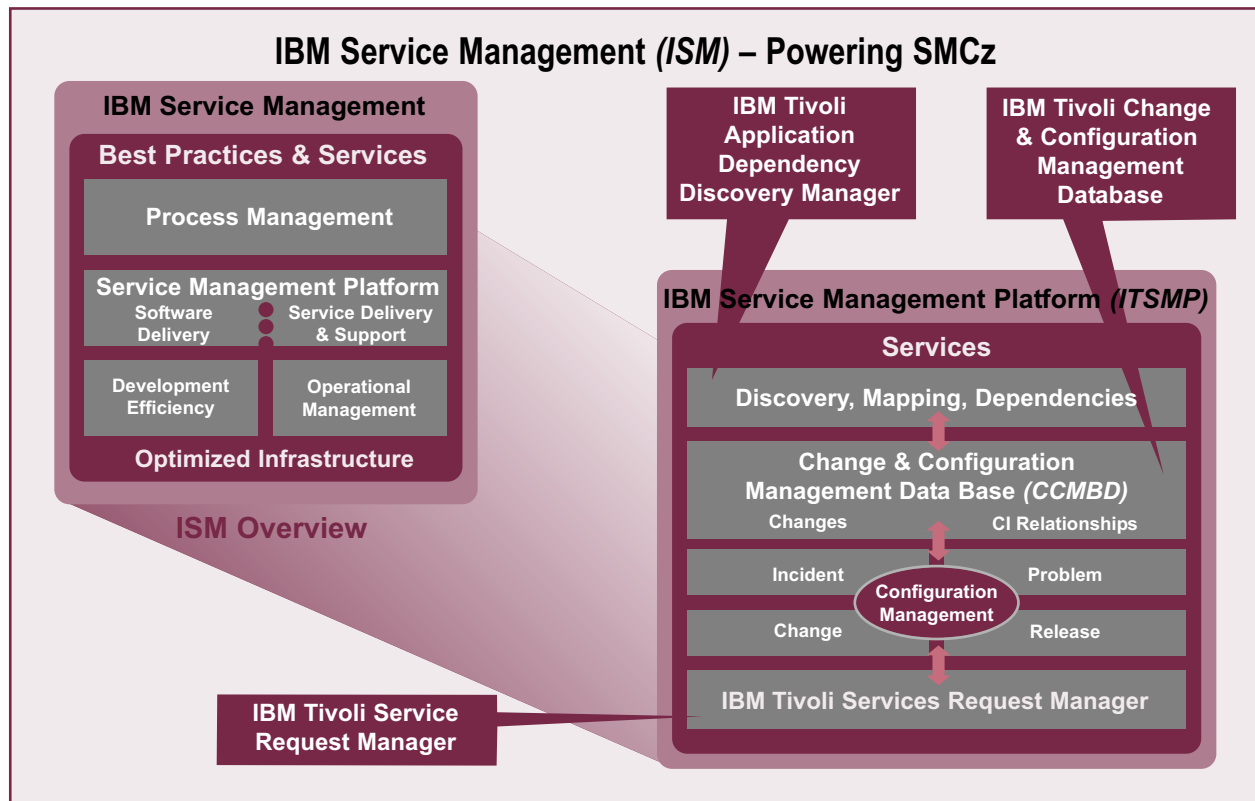


Figure 11: IBM Service Management – Powering SMCz

The three layers of the ISM architecture (*left-hand side of the chart*) rest upon the enterprise’s (*hopefully*) optimized IT infrastructure, and consist of:

- **A base layer**, comprising an extensive, integrated operational systems management capability (*IBM Tivoli portfolio*) and development efficiency capabilities (*IBM Rational application development tools and team development portfolio*).
- **The ITSMP**, the tightly integrated middle layer of the architecture, built over the base layer above, is expanded on the right-hand side of Figure 11. Three of the foundation ITSM products are also named around this side of the chart. The IBM Tivoli Service Request Manager, shown at the bottom of the right side of the chart, for example, provides the enterprise repository of all services, and offers extensive “service desk” functionality to support the management of services enterprise-wide, including the functions of the process managers below.
- **Process management upper layer**, providing best practices-based (*Information Technology Infrastructure Library (ITIL) v3*) process management capabilities for major IT operational processes – including Incident Management, Problem Management, Change Management, and Release Management, etc. – under the control of enterprise-wide configuration management capabilities.



These ISM capabilities enable enterprises to implement fully integrated Enterprise Service Management (ESM) using processes based upon industry best practices from ITIL (or other frameworks), shown at the top of Figure 11's left-hand side. ISM is an extensive, sophisticated, three-layer architecture, with many powerful capabilities.

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*These ISM capabilities enable enterprises to implement fully integrated ESM using processes based upon industry best practices from ITIL*

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ISM delivers increased **Visibility**, **Control**, and **Automation**, as described in the following three subsections below.

## Real-time Business, Compliance, & Operational Dashboards Increase Visibility

Visibility lets organizations “see” their business better. Business and operational staff often lack the visibility they need to manage most effectively towards business objectives. Achieving best results from complex service infrastructures (including IT) demands a good knowledge of how the business is actually performing dynamically, and from different viewpoints. Without such actionable “service intelligence”, the success of business processes and strategies cannot be quantified, emerging technical problems cannot be tracked down and solved, and regulatory compliance remains elusive or too complex.

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*These each take advantage of existing assets but add the real-time visibility needed to better manage towards the real business objectives.*

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ISM provides targeted, real-time business, compliance, and operational dashboards. These each take advantage of existing assets – the organization’s tools, information, and people – but add the real-time visibility needed to better manage towards the real business objectives. The roles of these three distinct types of dashboards include:

- **Business dashboards** display service performance in a real business context. As technical changes occur, their business impact can quickly and easily be quantified and prioritized. Such dashboards draw information from both business and IT sources. They connect and display this information to show exactly how IT performance is affecting the business objectives, such as profit and loss, transactions, and the end-customer experience. This is quite different from traditional IT system resource management, which covers only the technical status of each individual IT system resource element in isolation. (*Often called IT “silo management”.*)
- **Compliance dashboards** display the indicators/metrics which confirm that an organization is (or is not) properly complying with mandated regulations, like the US Sarbanes-Oxley Act, or Health Insurance Portability and Accountability Act (HIPAA) rules. Such regulations now often specify how sensitive information should be managed, monitored, and modified by regulated enterprises. For audit, such a dashboard delivers invaluable information on availability, performance, integrity, and business activity. From such dashboards, appropriate reports can also be generated that can conclusively demonstrate full compliance was actually achieved via systematic application of adequate controls.
- **Operational dashboards** show the technical status of business services and their supporting IT infrastructures. Such dashboards are used to visualize emergent technical problems, and to highlight their business impact, early. They can often pinpoint emerging issues before customers are even aware of any problems. Subsequently, they can isolate service root cause, identify the correct problem owners, and help guide them through resolution.

## Manage and Secure Investments with Integrated Asset Control

Control, the second ISM focus area, is concerned with business and technology asset lifecycles. Here the goal is to yield the highest return on enterprise investments, whilst minimizing asset usage service problems. These goals can only be attained via best-in-class, integrated Enterprise Asset Management (EAM), IT Asset Management (ITAM), change management, and security management processes.

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*Achieving superior enterprise business results demands that the fullest possible usage of all the assets that the enterprise has purchased and deployed is achieved, that all assets are well-maintained, are carefully tracked, and are used to their best value all round.*

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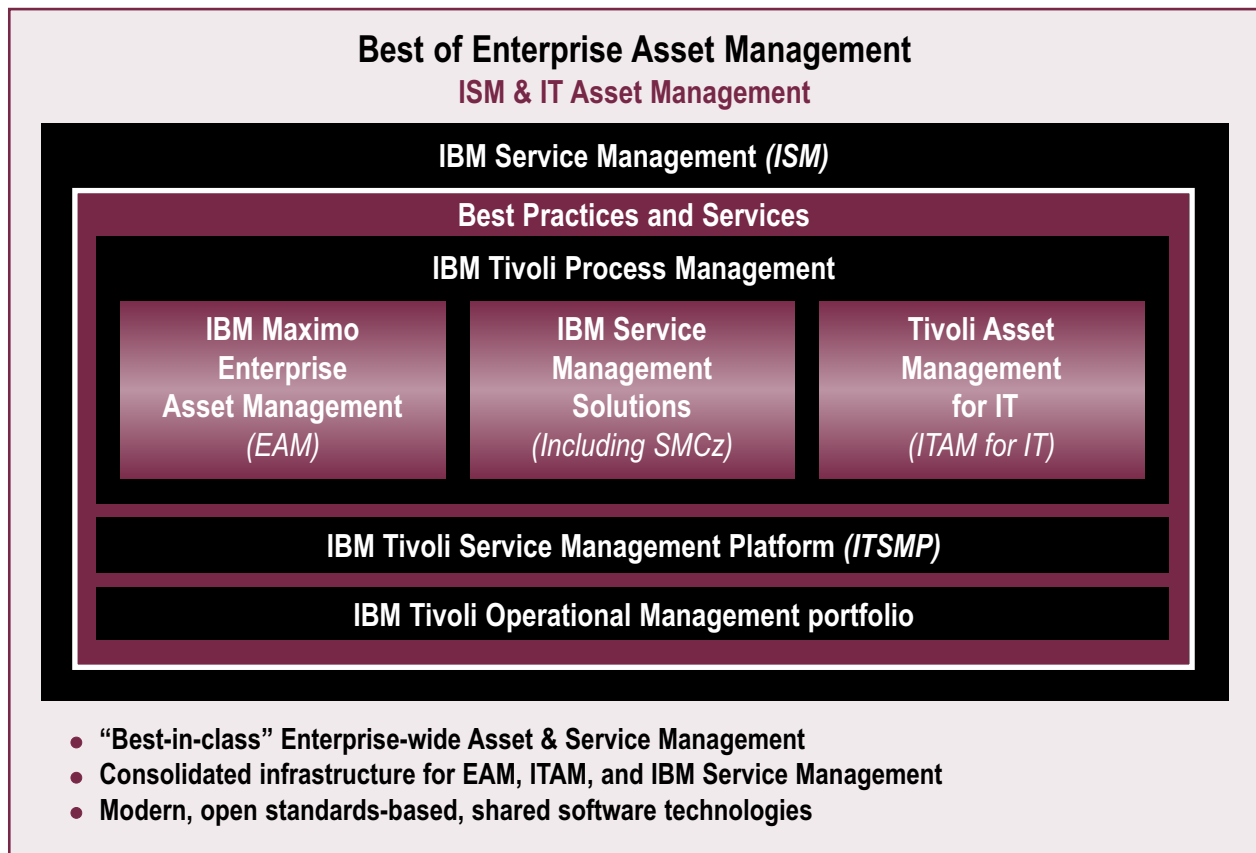
Achieving superior enterprise business results demands that the fullest possible usage of all the assets that the enterprise has purchased and deployed is achieved, that all assets are well-maintained, are carefully tracked, and are used to their best value all round. Many valuable and costly assets actually get lost altogether, degrade or become unavailable, and remain surprisingly poorly utilized. Finance Week, for instance, reported that typically only 40% of enterprise assets are fully tracked and available, with the remainder delivering much-diminished business value.

IBM proposes integrated EAM control solutions that help discover and use all enterprise assets (*and not just IT assets*) as fully as possible. ISM asset control solutions now provide integrated means of managing all types of enterprise assets. These solutions now deliver close integration with Enterprise Resource Planning (ERP) applications. They also offer full support for leading-edge technologies, such as Radio Frequency Identification, to monitor all major physical assets, such as pumps, generators, trucks, ships, planes, as well as linear asset classes (*road, rail, pipeline, tunnel, transmission line, fiber-optic cable run, etc.*). The business information that these EAM solutions generate can be integrated into wider business model transformations, and into corporate “green” initiatives, bringing more effective

*IBM proposes integrated EAM control solutions that help discover and use all enterprise assets (and not just IT assets) as fully as possible.*

cost management and budgetary control to asset utilization. Today, a rapid process of convergence is in progress between plant and facilities asset management, and the management of IT assets. More and more plant/facilities today are now digitally controlled and enterprise IP infrastructure-connected, just like all IT systems, and so managing both types of asset through an advanced, common, EAM software infrastructure makes huge sense. IBM’s now-extensive EAM solutions are known as the IBM Maximo portfolio. These joined the Tivoli fold with IBM’s October 2006 acquisition of leading EAM Independent Software Vendor (ISV), MRO Software. With the end-to-end tracking that these solutions provide, enterprise assets are far less likely to get lost. Through improved asset status level monitoring, problem tracking and resolution, these ISM solutions deliver significantly improved business values by ensuring a more robust service from the asset portfolio.

The close relationship between these IBM Maximo EAM solutions with ISM and ITAM is illustrated in Figure 12.



**Figure 12: Best of Enterprise Asset Management – ISM & ITAM**

The IBM Maximo EAM solutions run alongside the ISM solutions (*which include IBM Tivoli Service Management Center for System z (SMCz), our focus here*) and alongside IBM Tivoli ITAM solutions, as three different classes of process managers. All three are built on the shared, common IBM Tivoli Service Management Platform infrastructure, based on open-industry software standards. This is layered above the IBM Tivoli operational management products portfolio that each manage specific IT resources. All three classes of process manager use service best practices from leading frameworks such as ITIL. EAM is an important, fast-growing, newer business discipline that offers major asset management improvement benefits to its adopters, addressing an often previously neglected area. The extensive IBM Maximo EAM solution portfolio is market/class-leader in this large and developing application solutions space.

However, the remainder of this Paper focuses specifically on ISM and SMCz, to keep within our single-subject bounds. The common IBM Tivoli Service Management Platform underpinnings, however, are a major advantage and many customers will implement all three areas over time atop this common infrastructure.

## More Agile, Productive IT Operations Through Automation

Automation is the third major value delivered by ISM, and is the most familiar in this Paper's IBM Tivoli service management context. ISM now helps to optimize/integrate the complete operational business services that support the enterprise's main revenue-generating business processes (*often now underpinned by new Service Oriented Architecture (SOA) applications*). When better operational process automation is deployed, valuable resources are freed from reactive, maintenance-intensive support work, and can be moved onto business growth and competitive edge-enhancing projects. In addition, improved performance, reliability, and efficiency for the operational business can be achieved. For many Chief Information Officers (CIOs) today, a full 75%, and often 80%, of their annual IT budget is often spent on operational expenses devoted to supporting and running their existing systems.

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*When better operational process automation is deployed, valuable resources are freed from reactive, maintenance-intensive support work, and can be moved onto business growth and competitive edge-enhancing projects.*

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Through service management process improvement and automation, large swathes of these precious human/financial resources can be freed-up to be turned towards business innovation for enhanced, as well as to new revenue-generating services that grow top and bottom lines. ISM solutions exploit existing and new IBM Tivoli & Rational tools, can adopt best practice processes (*including ITIL, enhanced Telecom Operations Map (eTOM), Control Objectives for Information and Related Technology (CoBiT), Six Sigma, and others*), and can benefit by moving up to full closed-loop processes across the whole service lifecycle. IBM provides an extensive set of professional services covering all aspects of ISM, based on the rich experience it gained from helping thousands of IBM customers in this arena.

## Our Analysis – Extensive IBM Tivoli Portfolio Supports ISM

Distributed Web applications, new SOA composite applications, and extended/new mainframe workloads, often carrying high transaction volumes, many needing 24\*7\*365 availability and/or global accessibility, created major new IT management challenges. IT users have long needed more sophisticated management/automation, with tools better geared to manage, monitor,

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*IT users have long needed more sophisticated management/automation...*

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support, secure, and optimize, their complete business services that today often run over heterogeneous IT infrastructures, including the again-favored System z mainframe.

System z customers have increasingly used the now-broad, much-expanded range of IBM Tivoli resource management tools to manage the operating system images/Logical Partitions (LPARs), System z subsystems, and the IBM middleware servers running on their mainframes. These environments include varied combinations of z/OS, z/VM, zLinux, DB2, Information Management System (IMS), Customer Information Control System (CICS), WebSphere Application Server (WAS), WebSphere MQ (WMQ), Transmission Control Protocol/Internet Protocol (TCP/IP), and Resource Access Control Facility (RACF). These are all crucial IBM operating system or middleware runtime infrastructure servers/subsystems.

System z customers have increasingly used the now-broad, much-expanded range of IBM Tivoli resource management

The IBM Tivoli software portfolio, our focus here, now provides extensive support centered on the operational management (*"managing value delivery"*), including performance management, tuning, and security, of business services over their production lifecycle. IBM Rational's Application Development (AD) tooling portfolio mainly supports the AD (*"creating new value"*) phases of building new business services, as well as their testing and maintenance throughout their lifecycle. We reviewed the latest Rational offerings on System z in another of our recent White Papers (*see page 81, item 1*) and so do not cover these here. There is also some crossover between the two software brands: some Rational tools help support certain operational management tasks, and some Tivoli tools aid parts of the development lifecycle. For this reason, the tight integration IBM has built in between the two is important to customers, simplifying their work.

To illustrate the wide breadth/depth of IBM Tivoli product support IBM now offers for SMCz, Figure 17 on page 50 lists the main Tivoli products supporting the "managing value delivery" side of the service lifecycle. This extensive range includes numerous familiar, well-established Tivoli operational system management products, complemented by the spectrum of new, IBM Tivoli Service Management Platform components and process manager offerings. In Figure 17, some terse, one-line entries, for example, those for IBM Maximo, IBM Tivoli OMEGAMON XE, IBM Tivoli Netcool, and for IBM Tivoli Composite Application Manager, each refer to now-extensive families of related product solutions.

## 6. IBM Tivoli Service Management Center for System z Overview

### SMCz's Arrival Highlighted at IBM Tivoli Pulse 2008 Conference

A highlight of IBM Tivoli's Pulse 2008 service management conference (*see below*) was the availability announcement of **IBM Tivoli Service Management Center for System z (SMCz)**, which now hosts enterprise-wide business service management on the mainframe, the main parts of which became Generally Available (GA) on May 20<sup>th</sup> 2008. This new, tightly integrated, IBM Service Management (ISM)-based solutions portfolio automates key business processes, and simplifies IT operations. It achieves this by consolidating administration/support of all service management functions – whether these services run on mainframe or distributed servers – onto a central System z mainframe platform hub, bringing significant cost savings and higher productivity to IT operations enterprise-wide.

The fully-integrated SMCz solutions portfolio, organized into management domains, delivers service automation that significantly improves management within the System z environment, extending well-established mainframe operations automation with powerful new service management/process automation capabilities. These System z hosted solutions also deliver enterprise-wide business service and Information Technology Infrastructure Library (ITIL)-based service automation and process management across all enterprise platforms, exploiting the System z environment's unrivalled advantages and unique Quality of Service (QoS) as the hub/host.

SMCz offers powerful benefits to System z users, who gain from improved integration between the multiple software applications used over their business. The new SMCz offerings allow automation and simplification of management for critical operational processes; they also introduce powerful new capabilities for more efficient service delivery.

SMCz's advanced service management and process automation technology links together the often complex, fragmented "silos" of technology that most enterprises still run today. SMCz is designed to provide enterprise IT staff with far greater visibility into their operational technology environment, greatly reducing the management burden, and further increasing the value their IT investments provide to the business. With SMCz, enterprises can finally migrate away from the long-standing, fragmented, costly and inefficient "resource silo" system management approaches that most had no choice but to use to date. It allows them to transform IT operations into a centralized, service-centric, and much more highly automated, management model. SMCz therefore allows these organizations to strategically use their mainframe as their integrated, enterprise-wide hub for efficiently managing business and IT services.

### IBM Tivoli Pulse 2008 – New Era of IT Industrialization, IBM Declares – Delivers SMCz

IBM Tivoli hosted its first global conference devoted to service management, Pulse 2008, in Orlando Florida, over the week from May 19<sup>th</sup> 2008, attended by more than 4,000 IBM clients, business partners and employees. A major conference theme was IBM's

*IBM's bold declaration that IT operations are today  
now ripe for full industrialization...*

bold declaration that IT operations are today now ripe for full industrialization, like that which transformed the automobile and telecommunications industries (*amongst others*) over the past century. Back then, Henry Ford saw that streamlined, standardized production workflows could produce automobiles more quickly, with greater quality, for less expense, pioneering large-scale standardization, assembly lines, and automation in the then-new automotive industry. Later, automated call switching similarly enabled the explosion of the voice telecommunications industry the world now depends so heavily upon.

In his keynote Pulse opening address, Al Zollar, IBM Tivoli Software General Manager, detailed how, much like the assembly line and automation transformed those industries over the last hundred years, IBM considers that IT operations are now ready for a similar process of industrialization.

***"While IT organizations have automated some functions, the industrialization of IT operations is still in its early stages. IBM is now in the unique position to provide all the software, hardware, and the professional services to help customers move beyond today's often siloed IT resource management to industrialized operations,"*** said Zollar.

In recent years, companies began applying similar concepts to optimize, to simplify, and to automate their IT environments, to improve business service delivery and reduce their IT operational costs. Continuing addition of new enterprise applications has caused data center workloads to continue to grow, whilst the recent economic downturn has sharply focused IT executive attention on "doing more with less". IT infrastructure and operations executives have therefore been investing in service management to deliver higher quality services to their internal business customers at lower costs.

The industrialization of IT operations deploys a process of continuous innovation, using automation and best practices to link together the phases of designing, delivering and managing IT systems. Zollar told the Pulse audience that this has opened doors to new business opportunities for organizations competing in the global economy to deliver better quality services to customers, and to lower their cost of technology management by achieving greater efficiencies, yielding cost savings, and lifting staff productivity.

## Mainframe Ideal to Manage Enterprise Business Services, & Run Many

Today's mission-critical business services and composite applications present a unique management challenge. They typically span mainframe and distributed environments, are comprised of many interconnected application components, both commercial and custom, and rely on diverse middleware, databases, and supporting platforms. With mainframe user's rapid adoption of Service Oriented Architecture (SOA), the fast growth of new mainframe workloads, and the mainframe's wider use in new enterprise-wide roles (all assessed in Section 3), System z had again become the natural host from which to deliver major, modern business services and applications enterprise-wide.

Now, IBM's new SMCz software allows mainframe customers to also "industrialize and automate" operations and management of their enterprise business services end-to-end, fully exploiting the deep QoS/operational advantages of System z, as the central host "enterprise business services" platform, offering a single, portal-based, central point of service management control.

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*...IBM's new SMCz software allows mainframe customers to also "industrialize and automate" operations and management of their enterprise business services end-to-end...*

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## Co-launch with System z10 Signifies SMCz Importance

IBM first co-launched SMCz alongside the much anticipated and stunningly powerful next-generation System z10 Enterprise Class (z10 EC) mainframes (its highest-profile mainframe event for three years). This clearly signaled the high importance that IBM places on SMCz. SMCz was the main IBM software showcased with this latest IBM flagship platform at all four launch event cities worldwide. IBM clearly holds high expectations for widespread SMCz customer adoption over the next several years!

## New Enterprise Data Center, System z10, & IBM Tivoli SMCz

At the same event, IBM also launched the **New Enterprise Data Center**, its new data center model/roadmap to provide customers with more sustainable, efficient, and dynamic business computing, which has the System z10 as its cornerstone. This new model starts

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*IBM Tivoli SMCz is a lynchpin of the New Enterprise Data Center, automating management of complex business services and supporting IT process automation on and from the platform across the whole enterprise.*

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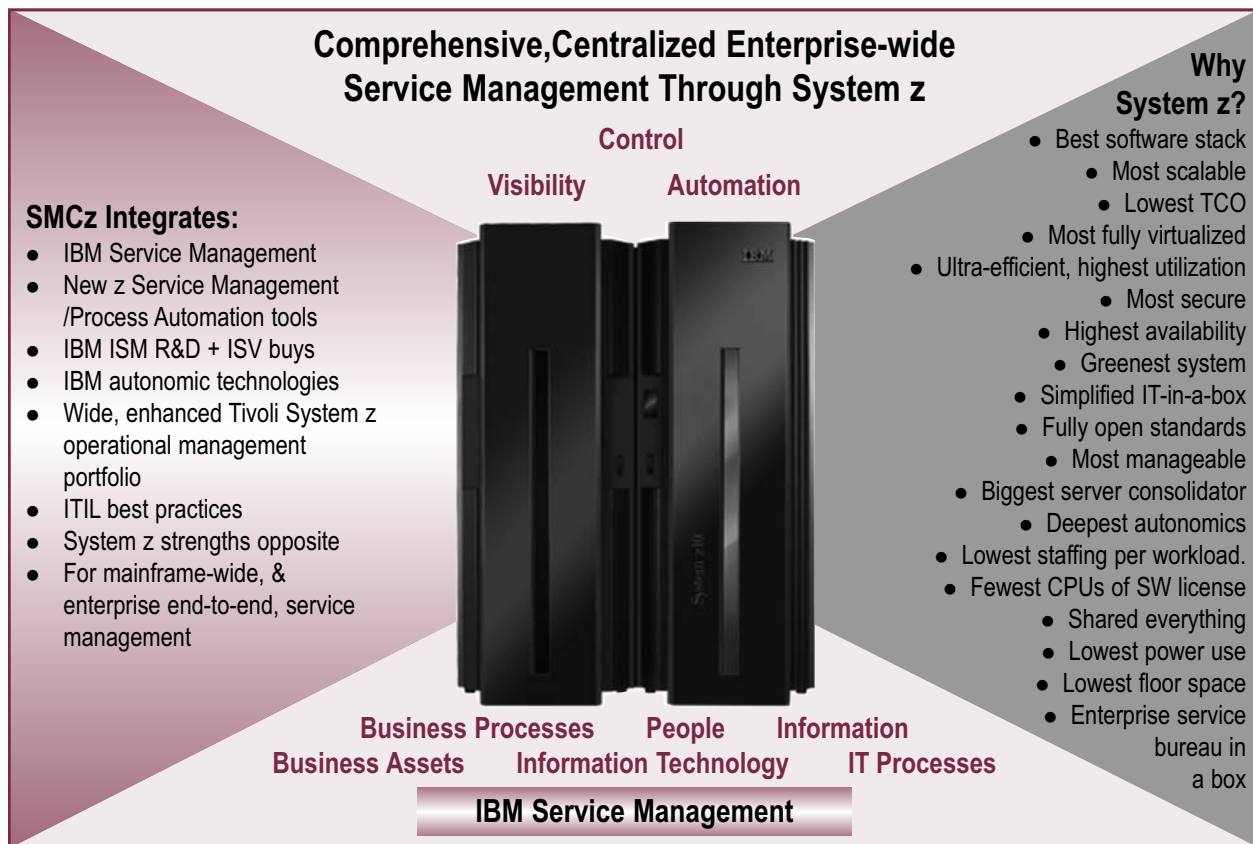
with infrastructure simplification, but then deploys virtualization, service management, and automation end-to-end across server, storage, and networking infrastructure. Since the new System z10 EC provides up to 70% more capacity, up to 100% more performance, has 35% better price/performance, runs at up to 100% utilization, and uses up to 20% less energy than its competing platform, widespread further consolidation of additional workloads onto this powerhouse are certain. The z10 thus lets enterprises sharply reduce cost, energy use, and complexity in

their data centers, exploiting the mainframe's "Gold-Standard" virtualization, dynamic policy-based management, and new "Just-in-Time" Capacity on Demand (CoD). IBM Tivoli SMCz is a lynchpin of the New Enterprise Data Center, automating management of complex business services and supporting IT process automation on and from the platform across the whole enterprise.

## IBM Tivoli SMCz Overview

SMCz extends ISM (introduced/discussed in Section 5), allowing enterprises to deploy service management spanning all their IT platforms and operational processes, and strategically exploiting their System z mainframe(s) as their integrated, enterprise-wide hub to better manage all their real business (and IT) services end-to-end.

It delivers a **process automation** and **service management** infrastructure through new, highly integrated IBM Tivoli software. This exploits the high power and unique QoS of System z, equipping it as the enterprise-wide hub for business service management. SMCz also includes, and helps customers fully exploit, proven best practice processes from ITIL V3. It also offers innovative new IT financial management capabilities that enable the IT department to accurately account for, and recharge, all IT resource usage, and better manage all their software licenses, IT contracts, and IT assets, on their mainframe. This positioning, the elements that SMCz combines, what it seeks to deliver and integrate, and the System z unique strengths it exploits, are all concisely shown in our Figure 13 on page 38.



**Figure 13: Comprehensive, Centralized Enterprise-wide – Service Management Through System z**

SMCz is a **highly-integrated** approach focused on ensuring that IT attains significantly superior **visibility**, **control** and **automation** deployed to most efficiently and effectively deliver business services enterprise-wide over the entire IT infrastructure. It not only includes improving the management of all the workloads running on the mainframe itself, but also adds the new role of “Service Management Center” for the whole enterprise, which (*IBM argues*) can best be operated from a System z mainframe. This new mainframe role fully leverages and exploits the unique QoS of the mainframe, summarized on the right-hand side of Figure 13.

SMCz broadly improves visibility, control and automation with:

- Easy to use, **integrated** monitoring tools that provide end-to-end **visibility** of the enterprise, and which also proactively warn of critical situations early – greatly simplifying management.
- **Integrated tools** that provide end-to-end **control**, to help enterprises to effectively schedule and execute planned changes, optimize asset utilization levels, and to understand all the costs of their service delivery.
- **Tight and easy integrations** across SMCz solutions make it easier to **automate** operations across applications and environments – making the business process simple, efficient and effective.

SMCz extends ISM (see *Section 5*), providing deeper understanding of how all the enterprise’s business assets, business processes, business and IT staff, IT assets, IT applications, and IT processes all interact in operation (*as per Figure 13, bottom center*). This deeper understanding provides the ideal basis for integrating, orchestrating and optimizing these elements more tightly together, to deliver real business Key Performance Indicator (*KPI*) improvements.

SMCz leverages this deeper understanding to deploy best practices to core operational processes, enabling their automation at the higher business services level, where business and IT people can truly align with each other, and can more easily cooperate based on a common, shared understanding.

SMCz’s superior business-services-driven approach contrasts sharply with the conventional approach still used today by most enterprises. In this, IT operations manages each of the multitude of separate, individual IT resource types making up the enterprise IT infrastructure, viewing each as a separate “silo”, often using separate techniques and tools for each. Such piecemeal “resource silo management” has no hope of ever providing the vitally needed, end-to-end, comprehensive, business service-level view of how the real business operation (*and the technology that supports it*) is performing overall.

## SMCz Strategic Positioning Explained

SMCz now enables automated management of many complex IT operations processes, using ITIL framework best practices. Policy-driven processes, such as **incident and problem management**, **change and release**, **discovery**, and **business service management**, can now be smoothly managed enterprise-wide from the mainframe acting as the service management hub. The left side of Figure 13 shows that SMCz combines innovative new IBM Tivoli-developed software, and enhanced releases of well-proven IBM Tivoli System z operational management tools. It also includes new software products from several important IBM Independent Software Vendor (ISV) acquisitions, and a now-powerful range of IT financial management offerings that help IT groups “**better manage the business (\$) side of IT**”.

Customers can now use SMCz to drive business service and **industry-standard best practices based** on ITIL process management over all the systems and services running in their enterprise (see below). This **centralized service automation hosted on System z** fully exploits the mainframe’s unique QoS capabilities.

## IBM Tivoli SMCz Architecture

The three-layer architecture, scope, and service management functionality of IBM Tivoli SMCz are shown in Figure 14. SMCz runs above the enterprise’s hopefully “optimized IT infrastructure”, improving top-level business services with best operational practices used to secure major improvements. These three architecture layers are:

1. **IBM Tivoli SMCz Process Management Solutions:** Software process managers that integrate/automate major IT operational management processes over organization silos, for better IT responsiveness & flexibility. These include **Incident and Problem Management**, **Change and Release/Configuration Management**, **Business Continuity Management**, and **Business Service Management**.

SMCz substantially extends System z operations automation by adding advanced process automation and service management capabilities to processes, both on the mainframe itself and across the other platforms used. SMCz thus offers major IT operations efficiency and business services delivery improvements by extending service automation and process integration over a much wider set of IT operational assets. It ties IT performance to the main business at KPI goals, reduces IT operating costs, meets tougher security, regulatory, and compliance demands, and improves business user satisfaction and alignment with IT.

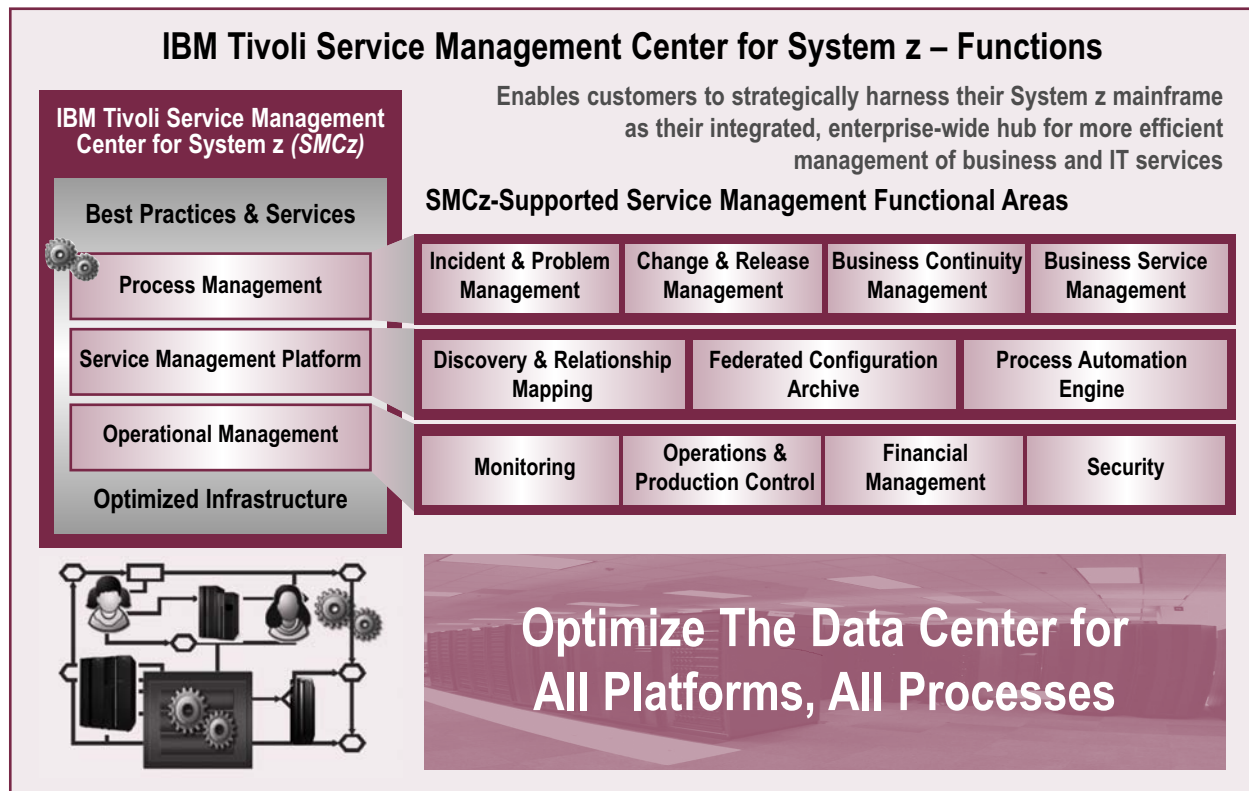


Figure 14: IBM Tivoli Service Management Center for System z – Functional View

- IBM Tivoli Service Management Platform:** System z-based software that discovers, standardizes, and shares crucial IT operations information about the entire enterprise applications infrastructure. This allows closer integration of people, processes, information, and technology for superior service management enterprise wide. SMCz uses the IBM Tivoli Service Management Platform, implemented on System z Linux, which comprises powerful **Application Dependency Discovery and Relationship Mapping**, an extensive **Federated Configuration Archive**, and **Process Automation Engine** capabilities. These capabilities help users integrate, automate and optimize data, workflows, and policies, and allow them to better align IT infrastructure management with real business priorities. The tools supporting these functions also tightly integrate with, and combine data from, the extensive set of IBM Tivoli operational management products (*that are particularly rich on System z*).
- IBM Tivoli Operational Management Solutions:** Systems management software which automates diverse areas of application and business service operational management, including System z-specific IBM Tivoli software for IT **Financial Management, IT Security Management, IT Operations and Production Control, and IT Performance Monitoring and Management**. The IT Financial Management capabilities of SMCz are hugely important, innovative, and impressive, including the leading, new-generation, IT usage accounting and chargeback product for complex virtualized IT environments, which includes System z.

Select main System z SMCz solution products now available are introduced in Figure 15, using the same SMCz architecture format as in Figure 14 (on page 39) indicating where each of these fits into that architectural view.

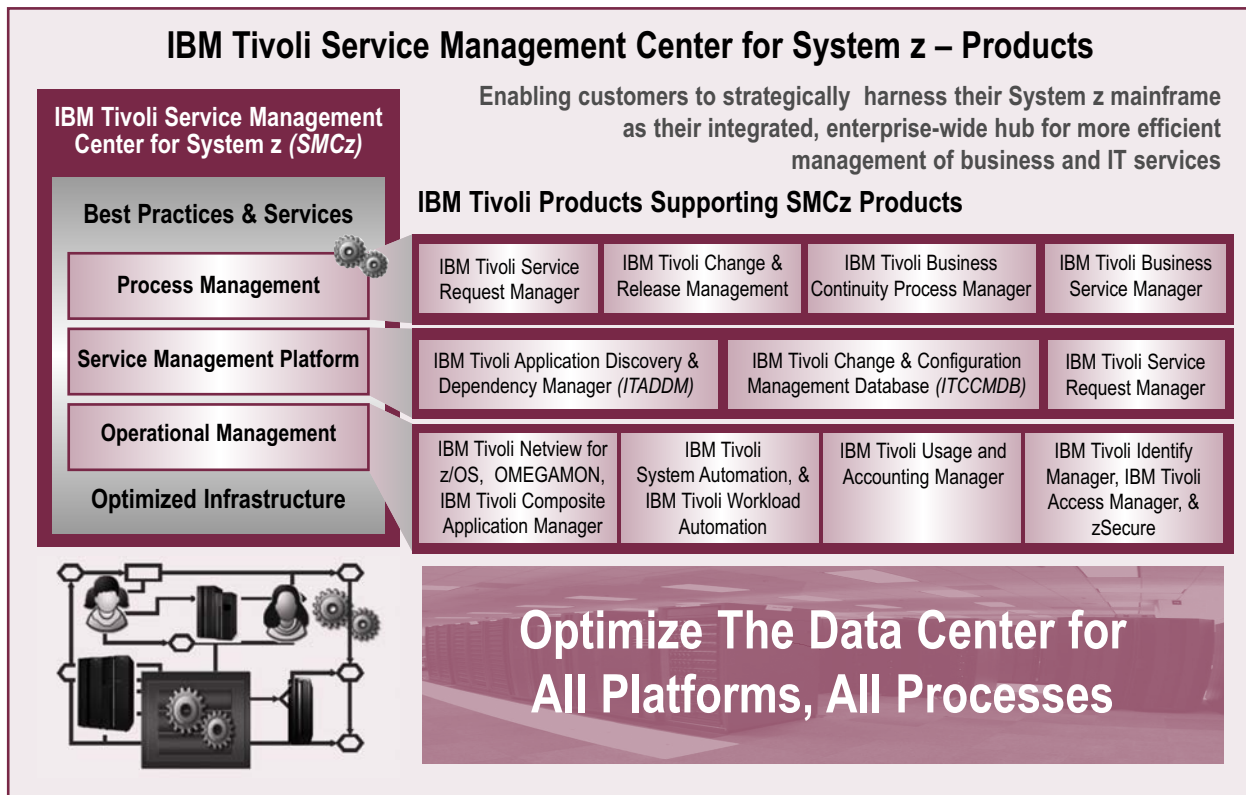


Figure 15: IBM Tivoli Service Management Center for System z – Product View

## Our Analysis

SMCz is a new set of integrated solutions and building-blocks that allows enterprises to adopt, implement and host an enterprise-wide service management and process automation hub on their System z mainframe(s). SMCz's modular, well-integrated software automates key IT operational processes. It also simplifies enterprise infrastructures by consolidating administration/control of all service management initiatives – whether actually run on mainframe or distributed servers – onto the single mainframe hub platform for the greatest cost savings and highest efficiency.

SMCz supports IBM's New Enterprise Data Center model, by providing a business-driven service delivery and management hub, based on ITIL and IBM best practices. It provides end-to-end visibility, control, and automation over the delivery of business services and the management of IT infrastructures.



Crucially, SMCz better aligns and brings together business and IT teams, by giving users and the IT department clear visibility into which business processes or tasks are affected by a specific resource's performance, or other operational issues. Joint teams can solve such problems, and improve business services (*that may span across diverse platforms*) faster, in-line with the real business KPI priorities, a major advance over managing IT resource "silos" (*such as application, network, database, and server*) in isolation.

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*SMCz better aligns and brings together business and IT teams, by giving users and the IT department clear visibility into which business processes...*

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IBM brought this SMCz portfolio to the forefront of its mid-2008-on marketing with excellent timing. The huge investments IBM made to deliver new-generation mainframes, and the advanced new IBM Tivoli SMCz, are to be warmly welcomed. SMCz now offers enterprise users major help to better manage business services, increasingly often built on SOA composite applications across heterogeneous platforms, as well as on the mainframe.

SMCz's advanced process automation offers major relief to the excessively high share of IT budgets locked up with operating existing applications, systems, and infrastructures. SMCz can also further multiply these valuable IT Service Management gains when enterprise users also wisely consolidate their wasteful distributed server workloads, and their overly complex IT infrastructures, back onto centralized, highly-virtualized, and more manageable System z10 mainframe, far the industry's most advanced enterprise server platform.

## 7. IBM Tivoli Service Management Center for System z (SMCz) – In Detail

### Introduction

In this Section we drill-down more deeply into the SMCz architecture and review the extensive IBM Tivoli product sets that support it, across each of the six main domains of SMCz software. These reflect the three SMCz architectural layers (*numbered 1,2 & 3*) below that were introduced in Section 6, and are:

1. **IBM SMCz Process Management Solutions Domain.** (*Top level of the ISM, SMCz shared architecture.*)
2. **The IBM Tivoli Service Management Platform (ITSMP) on System z Linux.** (*Middle-level of IBM Service Management (ISM), SMCz architecture.*)
- 3.1 **SMCz – Transforming Enterprise-wide IT Financial Management.** (*Lower level of SMCz architecture.*)
- 3.2 **SMCz – Enhancing Enterprise-wide IT Security Management Domain.** (*Lower level of SMCz architecture.*)
- 3.3 **SMCz – Operations and Production Control Domain.** (*Lower level of SMCz architecture.*)
- 3.4 **SMCz – System Monitoring & Performance Management Domain.** (*Lower level of SMCz architecture.*)

Items 3.1. to 3.4. above are the four major domains of IT operational and financial management for System z that comprise the third layer of the architecture. These are extensively supported by IBM Tivoli products that are tightly integrated with each other, and are also fully integrated with the layers 1 and 2 of SMCz (*wherever appropriate*), to provide comprehensive and cohesive Enterprise Service Management (ESM) solutions which fully exploit System z.

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*IBM has created a powerful set of ITIL best practices-based process managers for the main IT operational process areas.*

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We assess and review each of these six SMCz domains in turn below. These domain reviews follow a common structure, comprising an overview introduction, a functional view of the scope of that domain, a products view profiling each main IBM Tivoli SMCz- supportive domain product, and each concluding with our analyst comment/assessment section. Because of the

substantial number of SMCz-related products mentioned, the descriptions in this Section 7 are brief; we also present a consolidated list of products cited in Figure 17 on page 50 as an at-a-glance reference. However, fuller review/assessments of the most SMCz significant and/or newer/enhanced products are also included in Appendix C (*from page 62*) grouped in the same six domains, and in the same order as here and in Figure 17.

### 1. IBM SMCz Process Management Solutions

**Overview:** IT Process Management is a crucial, central part of the ISM strategy, and thus of SMCz. Running above the ITSMP infrastructure (*assessed below*) IBM has created a powerful set of Information Technology Infrastructure Library (ITIL) best practices-based process managers for the main IT operational process areas.

**Functional View:** The group of process managers that IBM now offers covers the following major operational processes in the service management lifecycle:

- **Incident and Problem Management:** This process establishes visibility, for the IT operations and production teams, into incidents and process-related events, before they can affect service delivery or business user satisfaction. This process also initiates recovery steps to speed mean-times-to-resolution, and to minimize problem impact on the business.
- **Change and Release/Configuration Management:** This process establishes control over all requested changes to business service plans, schedules, and IT assets. The process also provides visibility into the impact of requested changes on the business, and automatically resolves cross-enterprise conflicts.
- **Business Continuity Management:** This process establishes control of, and manages the risks to, the smooth running of the enterprise, and/or to the delivery of a business service, ensuring the continuity of critical business functions should a disruption occur, and ensuring effective and timely service recovery afterwards.
- **Business Service Management:** Establishes full, real-time visibility into actual business service delivery performance, and provides business impact analysis of incidents and process-related events. It links key IT components to business Key Performance Indicators (KPIs) and goals, allowing enterprises to understand/predict technology impacts onto the business, and how business changes impacts IT infrastructure. Implemented with dashboards that allow full, real-time visualization of the performance of operational business services and of their supporting IT resources, providing common understanding for both business and IT staff. It establishes a focal point for end-user contact, incident, availability, and service management, to better control end-user satisfaction and self-service capabilities. Figure 16 shows an example SMCz enterprise “Business Service Dashboard”, which delivers far clearer visibility into enterprise-wide business services for business and IT operational managers. The notes on this Figure clearly explain why such holistic, real-time dashboards are a vast advance over earlier generation, IT technology resource-silo-based console displays. IBM Tivoli Business Service Manager (ITBSM), introduced below, generates these impressive real-time dashboards.

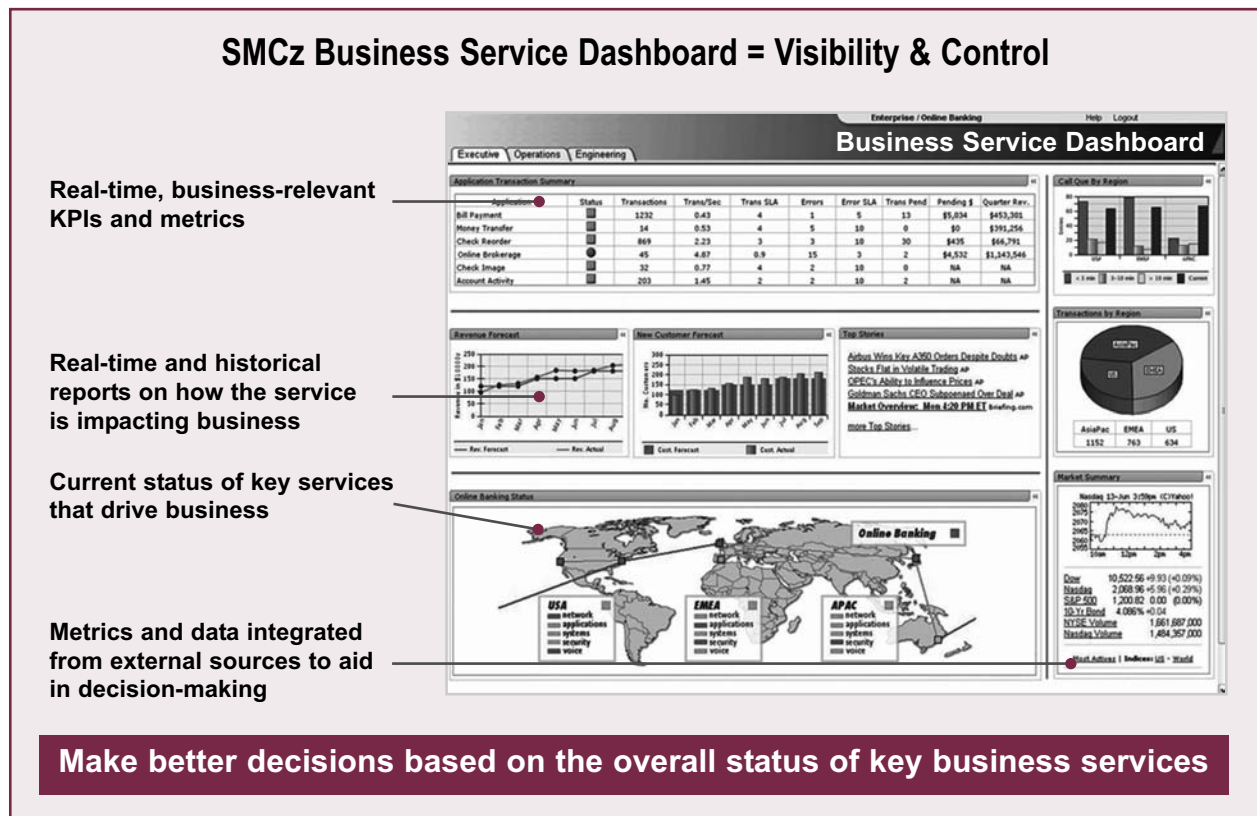


Figure 16: SMCz Business Service Dashboard = Visibility & Control

**Products Overview:** IBM now offers process manager software for each of the main IT operational processes above. Each embodies industry best-practice, ITIL-based process workflows that optimize and automate that class of IT management operation. Two main process managers now run on System z Linux so far, integrating with the SMCz IBM Tivoli Project Management Professional (ITPMP) foundations now also running there, supporting those processes enterprise-wide. Three other process managers currently run on desktop/distributed platforms, with no System z-specific versions yet announced. We discuss why zLinux is the ideal SMCz host environment at the end of this Section.

- **IBM Tivoli Service Request Manager (ITSRM) V7.1:** For enterprise-wide service problem and incident request management, and service catalog functions, see below.
- **IBM Tivoli Release Process Manager (ITRPM) for System z Linux V7.1.1:** Provides a process-based solution to address Release Management as defined by ITIL. Automates complex deployments in the context of the enterprise's overall release management process, enabling impact assessment before release deployment. General Availability (GA) May 20<sup>th</sup> 2008.
- **IBM Tivoli Business Continuity Process Manager (ITBCPM) for System z Linux V7.1:** Provides highly configurable and adaptable, ITIL-aligned processes for planning, testing, and execution of recovery and continuity activities for disaster situations – Disaster Recovery/Business Continuity (DR/BC). These are integrated with existing Tivoli software solutions that support the invocation, monitoring, and completion verification of DR/BC operational tasks. These include the including IBM Tivoli System Automation for z/OS, the Geographically Dispersed Parallel Sysplex (GDPS) solution, and the ITSMP foundation products – the IBM Tivoli Change & Configuration Management Database (ITCCMDB) and the IBM Tivoli Application Dependency Discovery Manager (ITADDM), In SMCz GA May 20<sup>th</sup> 2008.
- **IBM Tivoli System Automation Application Manager (ITSAAM) (for z/OS or zLinux) V3.1:** Just launched at IBM Tivoli Pulse 2008, ITSAAM enables high availability and disaster recovery for composite applications that span complex heterogeneous environments. It helps enterprises coordinate and manage across heterogeneous cluster technologies, to achieve better control of enterprise business services, from one, powerful, Single Point Of Control (SPOC), z/OS in SMCz here. From this SPOC, ITSAAM manages high-availability operations and cross-cluster resource dependencies, over any combination of System z, Linux, AIX, Windows and Solaris cluster platforms. GA June 13<sup>th</sup> 2008.
- **IBM Tivoli Availability Process Manager (ITAPM):** Provides visibility into IT components, applications and their business impact. Furnishes the necessary tools to effectively diagnose and prioritize incidents and problems, helping IT professionals to quickly determine and prioritize their impacts. (Currently for desktop/distributed platforms, no System z specific version announced.)
- **IBM Tivoli Capacity Process Manager (ITCPM):** Helps enterprises to manage/monitor IT infrastructure resource capacities, by implementing, enforcing and tracking capacity management processes to ensure the right capacities. Its fully customizable and predictable capacity management process workflow ensures capacity-related activities are completed in proper sequence under management control. Closely integrated with the ITCCMDB (see below) now System z Linux-based. (Currently on desktop/distributed platforms, no System z-specific version announced.)
- **IBM Tivoli Storage Process Manager (ITSPM) V6.2.1:** Provides a set of customizable ITIL-aligned storage management processes. Manages and coordinates simple and complex change, configuration and incident management processes for an IT storage environment. (Currently on desktop/distributed platforms, no System z version announced.)
- **IBM Tivoli Business Services Manager (ITBSM) V4.1:** ITBSM delivers real-time enterprise business service visibility and intelligence to maximize operating performance. Supports line of business and IT executives, managers and staff by visually

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*ITSAAM enables high availability and disaster recovery for composite applications that span complex heterogeneous environments.*

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*ITBSM delivers real-time enterprise business service visibility and intelligence to maximize operating performance.*

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showing, through business dashboards and service scorecards, how the business is actually delivering against its real business KPIs, and also showing how the business services are performing against their Service Level Agreement (SLAs). Helps ensure the continuous health of services, processes, transactions, missions, and business activity, speeding problem resolution with automated analysis. See example business dashboard delivered by ITBSM in Figure 16 on page 42. (Distributed platforms.)

- **IBM Tivoli Unified Process Composer (ITUPC) V7.1:** Provides detailed documentation of IT Service Management (ITSM) processes based on industry best practices. Offers detailed content and tooling to enable content customization, extension and publishing. (*Workstation product.*)
- **IBM Tivoli Unified Process (ITUP):** Workstation-based, free-of-charge, read-only, IBM knowledge sharing product. Hosts, structures, and provides customers with easy access to a wealth of IBM Tivoli operational and service management best practices, based on IBM Global Services (IGS) and Tivoli's service and operational systems management engagement experience with thousands of customers. (*Workstation product.*)

**Analyst Comment:** Each process manager above is closely integrated with the other central ITSMP products discussed next in subsection 2 below, and with relevant IBM Tivoli operational management, or subsystem products. For example, the new IBM Tivoli Business Continuity Process Manager (ITBCPM) for System z Linux (*discussed above*) integrates tightly with the IBM Tivoli Change and Configuration Management Database (ITCCMDB) and with the IBM Tivoli Application Dependency and Discovery Manager (ITADDM), both core ITSMP components on System z Linux. It also integrates closely with the IBM Tivoli System Automation for z/OS (ITSA for z/OS) product and the IBM GDPS solution that operationally runs geographically spread, multi-site, Parallel Sysplex clusters.

Three of the above process managers are not yet offered on the System z Linux SMCz platform – ITAPM, ITCPM and ITSMP – although these are currently available for distributed platforms: no dates have yet been announced for these to be made available on System z Linux. However, we have included them here for completeness.

## 2. The IBM Tivoli Service Management Platform on System z Linux

**Overview:** The heart of ISM, and thus of SMCz, is the **ITSMP**. This we introduced and first assessed in Section 5. ITSMP provides the foundation service management and process automation infrastructure that supports and runs the process managers above, and which is fed and supported by tightly-integrated IBM Tivoli operational management solutions. On the System z mainframe, the main ITSMP server component products (*discussed below*) run in the efficient, low-cost zLinux operating environment.

**Functional View:** Figure 11 on page 32 provided a useful, introductory graphical overview of the basic functionality of the core ITSMP components. In greater depth, these functionality areas are:

- **Service Request Management:** To standardize, document, track, manage, and control additions to, deletions from, and changes to, the services comprising the enterprise's business services portfolio, throughout their lifecycle. This enterprise service desk function centralizes, speeds, and controls the management of all service requests.
- **Services Catalog Function:** To provide a central, enterprise-wide catalog which holds details of all the enterprise's available IT services, their capabilities, SLAs, security, availability, and usage rules, etc.
- **Discovery and Relationship Mapping:** Automated application mapping and discovery across the entire mainframe and enterprise networked environments, to discover, map and visualize the interdependencies and relationships between actual deployed applications, middleware, databases, computer systems, and network devices, using agent-less, credential-free discovery capabilities. A crucial enabler for business service management and main feeder for the federated enterprise IT configuration archive below.
- **Federated Configuration Archive:** An enterprise-wide database platform for storing deep, standardized, configuration, and configuration change data. Provides the underpinnings for successful ISM implementation, reduces architectural complexity, and cuts the effort, time, and cost, of operations incident and problem management. Fed and updated by the discovery and relationship mapping capabilities above.
- **Process Automation Engine:** Process execution engine and common facilities that support and enable the automation of all types of IT operational process workflows to support the business services the enterprise is running. Executes predefined workflows for IT operational processes, which incorporate best practices, notably from ITIL.
- **Business Service Management:** See description above.
- **Enterprise Asset Management (EAM):** See Section 5 around Figure 12 on page 34 for description – outside our scope here.

**Product View:** SMCz now provides/delivers these ITSMP foundations, with the main server products now implemented for the System z Linux environment. Extensive integrations are provided to/with the process managers above, and to the IBM Tivoli System z operational management software discussed below, as well as across the products within ITSMP (*also discussed below*).

These foundations are:

- **IBM Tivoli Service Request Manager (ITSRM) V7.1:** Tool to manage all end-user IT services requests, with extensive enterprise service desk and service catalog capabilities. Service desk functions offer day-to-day management of incidents and problems, and the service catalog enables users to obtain IT services from published service offerings. This enables much-improved service efficiencies, reduced disruptions, streamlined service desk operations, improves customer satisfaction, and reduced services costs by unifying service support and asset management processes enterprise-wide. Supports extensive integrations with other ITSMP, IBM Maximo Asset Management, and IBM Tivoli operational management products via provided adapters. GA May 16<sup>th</sup> 2008. *(IBM Maximo N-tier solution. Window client workstation, Windows development workstation, distributed platform application server.)*
- **IBM Tivoli Application Discovery & Dependency Manager (ITADDM) for System z Linux V7.1:** Powerful enterprise application service & infrastructure auto-discovery solution, providing automated application dependency mapping and configuration auditing, that is an essential ISM underpinning, and central ITSMP component. ITADDM delivers comprehensive visibility into business applications running on major platforms by automatically creating and maintaining application infrastructure maps, including complete runtime dependencies, deep configuration values and complete change history. GA in SMCz May 20<sup>th</sup> 2008.
- **IBM Tivoli Change & Configuration Management Database (ITCCMDB) for System z Linux V7.1.1:** Provides an enterprise-ready service management database platform for storing deep, standardized data on configurations and change histories, to help integrate people, processes, information and technology. ITCCMDB is thus the common IBM Tivoli repository for all Configuration Items (C/Is) representing IT resources. The Discovery Library Adapters (DLAs) available discover most types of configuration data and store it in the ITCCMDB. GA in SMCz May 20<sup>th</sup> 2008.
- **IBM Tivoli Business Service Manager (ITBSM) V4.1:** See entry in subsection 1 above.
- **IBM Tivoli Enterprise Portal (ITEP) (for z/OS and zLinux) V6.2:** Enterprise-wide service management portal, unifying the delivery and role-based presentation of service monitoring, correlation, and alerting information, from the whole infrastructure in a single interface. In this usage, also delivers unified service dashboard presentations of business service and infrastructure status generated by the ITBSM product.
- **IBM Maximo Asset Manager V7.1:** Extensive, sophisticated EAM platform, and foundation for IBM Maximo vertical industry solutions. Shares core process automation technology with ISM and SMCz as well as with IBM Tivoli Asset Management for IT, discussed below. Further assessment is outside our scope here. *(IBM Maximo N-tier solution. Window client workstation, Windows development workstation, distributed platforms application server.)*

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*Powerful enterprise application service & infrastructure auto-discovery solution...*

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*The ITCCMDB is the heart of this ITSMP domain, and therefore of SMCz.*

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**Analyst Comment:** The ITCCMDB is the heart of this ITSMP domain, and therefore of SMCz. It integrates closely with the other application discovery (ITADDM – which maps the complex application and infrastructure interdependencies within the environment), business service management (ITBSM), and

service request management (ITSRM) components of the ITSMP, and with numerous IBM Tivoli operational products, such as the IBM Tivoli OMEGAMON XE family performance monitoring products discussed below. The ITCCMDB enables the automation of operational IT processes, such as change and configuration, asset management, incident and problem management, financial management, and others. These main ITSMP products now run on System z Linux, providing the enterprise service management foundation for SMCz on the mainframe, that supports the process managers described in subsection 1 above.

### 3.1. SMCz – Transforming Enterprise-wide IT Financial Management

**Overview:** Enterprise IT spend usually falls within the range 1% to 8% of corporate revenues for most top 10,000 enterprises, with wide variations by industry and geography. Total end-user global spending, on all vendor IT products and services, reached some \$1,750B in 2007, with about \$1,000B spent on all IT products, and some \$750B for all IT services, the latter (for example) posting a healthy 10.5% growth. 58 of the world's 100 largest corporations topped revenues of \$100B each in 2007 (*Fortune Global 500 – August 2008*), so most of their IT budgets were each measured in \$B. Hundreds more enterprises each spent into the \$100Ms on IT also. Managing the financial side of IT within the enterprise, given its size and importance to the business today, is therefore now a large, vital, but complex task. Economic slowdowns in many markets brought increased pressures on the IT department to help deliver business transformational change, whilst containing IT budget growth. For companies in growth economies and industries, IT is equally vital in supporting their business growth, and these expanding IT budgets need to be wisely managed under rapid change. Both demand radically improved financial management of enterprise IT itself: This SMCz now provides.

**Functional View:** SMCz brings powerful, modern software solutions to bear on improving the financial management of enterprise IT, leveraging the System z mainframe to centralize and manage enterprise-wide IT financial aspects better with powerful new tools. These now bring clearer visibility into actual mainframe and distributed platform resource usage patterns, into the true costs incurred to deliver services to end users, and can automate chargeback invoicing by department, user, or any number of other criteria. These also encompass IT asset management, software license management, and IT contract management. SMCz now powerfully addresses the following key IT financial management needs:

- **Enterprise IT Asset Management:** To track, monitor, preserve, value, and maintain in good order, all the enterprise IT assets supporting the business over their entire lifecycles. Assets include all physical IT hardware (*servers, storage, switches & networking gear, and desktops, etc.*) and all vendor software licenses (*operating systems, middleware, and applications*), as well as any other IT-related plant, equipment, and customer-created IT assets (*applications, skills, and resources*). The value of accumulated enterprise IT assets will usually be a significant multiple of yearly budget costs, representing huge IT asset total values to be preserved and sustained in larger firms.
- **IT Resource Usage Reporting, Analysis, Accounting, Billing:** Where system and other IT resources are shared, and/or need to be accurately rebilled internally or externally, a new generation of sophisticated, modern IT resource usage accounting and chargeback technology has long been urgently needed.

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*...a new generation of sophisticated, modern IT resource usage accounting and chargeback technology has long been urgently needed.*

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The far more complex, highly-virtualized, multi-workloads operation of large shared systems (*including the mainframe*) and the huge expansion of multi-platform applications running across distributed platforms, requires new resource accounting and chargeback software capabilities, and very-high capacities to handle the large data volumes now involved.

- **Software License Management and Compliance:** With the last two decade's huge expansion in the range and value of vendor software licensed by the average larger enterprise, external vendor software license, service and support costs are today one of the largest cost components in enterprise IT budgets. Today, these license-related costs therefore need more rigorous management and control to ensure best value for money, to eliminate obsolete or lightly-used products, and to ensure the enterprise in neither "under-licensed" (*non-compliant with licenses*) nor "over-licensed", with unused "shelf-ware software" license entitlements.
- **IT Service Contract Management and Compliance:** With the large scale, global span, and complexity of enterprise IT infrastructures today, IT organizations must now deal with numerous vendors, and manage often hundreds of associated vendor contracts for services and support, often in multiple locations. Ensuring the best contract value for all enterprise IT procurements, assuring timely contract review efforts, preparing carefully for contract re-negotiation and renewal, and ensuring contract compliance, are all vital functions needing advanced contract management software support.
- **EAM for Non-IT Assets:** Hugely important, parallel process to the IT asset management function above, is also today a corporate imperative, but falls outside our scope here. Many experts consider this application domain should today share common process management software infrastructure with ITSM and ITAM.

In larger enterprise IT organizations, most IT financial/contracts groups grew up in earlier decades, exercising some early versions of the above functions around their mainframes. Most such groups also assumed IT budgeting and planning, purchasing and procurement, and IT financial analysis responsibilities over time. As disciplined, experienced, and trusted IT finance teams handling large budgets, most such groups later assumed enterprise-wide, multi-platform, IT financial responsibilities when heterogeneous, distributed IT environments (*many originally line-of-business controlled*) were often pulled back under central IT control. Such IT finance groups today urgently need more sophisticated software tools, and a powerful, robust, centralized host financial management platform. These will enable them to apply tighter controls, ensure greater consistency, maximize resources, preserve IT assets, more fully and fairly apportion all IT costs, and to charge these back to users fairly across the enterprise, whilst better controlling IT costs.

**Product View:** The main IBM Tivoli SMCz new/enhanced products directly supporting these core IT Financial Management functions are now:

- **IBM Tivoli Asset Manager for IT (ITAM) for IT for System z Linux V7.1:** Helps enterprises efficiently and effectively manage all their IT assets over their whole lifecycle, to reduce costs, mitigate license and regulatory compliance risks and cost exposures, and to better align IT with business goals. ITAM for IT enables enterprises to achieve additional operational efficiencies and improved service levels, by better managing their enterprise IT assets, by optimizing asset sourcing and utilization, by reducing asset costs, and by improving asset service levels. Shares the common ITSMP with the IBM Maximo Asset Management solutions, with ISM, and with the SMCz portfolio on System z – see Figure 12 on page 34. GA May 16<sup>th</sup> 2008. (*N-tier architecture IBM Maximo platform application, now supports zLinux application server.*)

- **IBM Tivoli Usage and Accounting Manager (ITUAM) for z/OS Option V7.1:** SMCz's sophisticated, modern, usage accounting and recharge billing system for enterprise-wide IT resource chargeback on System z. ITUAM Enterprise Edition V7.1 also provides full usage accounting for distributed platforms (*including Windows, UNIX, i5/OS, and VMware*). ITUAM provides the basis for improving Total Cost of Ownership (TCO), by helping IT organizations accurately understand end-user usage patterns of business and IT service resources, and to understand true costs of services delivery. ITUAM is thus a powerful cost management tool designed to provide usage-based accounting and charging for IT system resources. It helps businesses determine their IT infrastructure costs by using features designed to accurately measure, analyze, report, and bill the utilization and costs of computing resources such as servers, storage, networks, databases, messaging, and many other shared services, in virtualized and physical forms. GA in SMCz May 20<sup>th</sup> 2008.
- **IBM Tivoli Decision Support (ITDS) for z/OS V1.8:** ITDS provides a centralized, consolidated, DB2 z/OS-based repository that collects and tracks enterprise-wide (*mainframe and distributed*) IT performance and system resource usage information. It supports efficient and accurate performance reporting, service level management, and usage accounting. ITDS reporting off this repository improves operational planning, aids cost management, and helps capacity-planning decision-making. ITDS helps performance analysts, capacity planners, and accounting and chargeback analysts. ITDS for z/OS is a main data source to the ITUAM z/OS Option software (*discussed above*) which can accurately recharge complex IT processing usage costs (*collected by ITDS*) to business units, users, and customers, etc., for fairly IT cost apportionment to users, and easier collection. GA October 5<sup>th</sup> 2007.
- **IBM Tivoli License Compliance Manager (ITLCM) for z/OS V4.3:** ITLCM for z/OS is a powerful software asset management tool for System z mainframe environments. It identifies software inventory, measures software activity, and automatically links license entitlements to help manage software costs and license compliance in mainframe environments. ITLCM for z/OS identifies software inventory with little or no usage, allowing removal or user recharge, to cut costs. It helps ensure software license compliance, and reduces software costs through advanced inventory and reporting capabilities enabling superior IT software asset and license agreement management and compliance. GA October 27<sup>th</sup> 2006.
- **IBM Tivoli License Compliance Manager (ITLCM) for System z Linux & Distributed Platforms V4.3:** Helps manage IBM and Independent Software Vendor (ISV) software costs and license compliance for distributed computing environments. Also identifies software inventory, measures software use activity, and automatically links complex license entitlements, enabling IT to align software spending with business priorities.
- **IBM Tivoli Contract Compliance Manager (ITCCM) V3.7.2:** Enables enterprise organizations to more effectively manage the contractual and financial details of all the enterprise's IT agreements. It helps IT groups gain tighter control of their organization's policies and IT governance, and provides a more secure, controlled IT infrastructure. Really cannot find much at all on this.
- **IBM Maximo Asset Management V7.1:** IBM's flagship EAM platform, centerpiece of extensive, sophisticated IBM Maximo EAM platform, industry solutions, products, and tools portfolio, but outside our scope here.

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*SMCz's sophisticated, modern, usage accounting and recharge billing system for enterprise-wide IT resource chargeback on System z.*

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**Analyst Comment:** In virtually every business environment today, determining the asset utilization, and the true operating costs of IT investments, is now absolutely essential to business-justifying IT resources and their expenses; the IT Financial Management function now needs much-improved software support. Most IT financial management groups are well used to operating in a centralized fashion, and have long been deeply familiar with the System z mainframe platform. These extensive SMCz capabilities now provide a sound, measured basis for bringing fuller visibility and control over unit costs of business and IT service delivery. They also provide the basis for visibility into understanding the financial impact of incidents and events on the business. In this SMCz domain, IBM has built-out real industry-leading strengths in software license cost, usage and compliance management, in enterprise systems resource usage and accounting solutions, in IT asset management, plus supplier contract management.

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*...IBM has built-out real industry-leading strengths in software license cost, usage and compliance management, in enterprise systems resource usage and accounting solutions...*

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We expect IT financial groups will rapidly and gratefully adopt, and fully exploit, these powerful SMCz IT Financial Management tools, running centrally on the System z platform they already know and trust greatly. The System z mainframe is ideally well suited to handle the high data and transaction volumes, the resulting large IT resource usage and asset databases (*DB2 on z/OS is perfect for these*), and to run the substantial processing workloads these enterprise-wide IT financial management applications require. The outstanding new IBM Cognos 8 Business Intelligence (BI)/Enterprise Performance Management (EPM) software, now out on System z Linux, and the other advanced IBM Information on Demand software, can also add further sophisticated analytics strengths to the already powerful baseline SMCz product's reporting capabilities.

## 3.2 SMCz – Enhancing Enterprise-wide IT Security Management Domain

**Overview:** Establishes visibility to, and gives greater control over, enterprise-wide audit and compliance enforcement challenges. Also provides automated, policy-based, security-related incident and event mitigation, and security/user administration, for improved business integrity enterprise-wide, from the rock-solid, secure System z SMCz hub environment.

**Functional View:** The SMCz security portfolio increases visibility to, and gives greater control over, audit and compliance enforcement, as well as automating security-related, audit and compliance management and enforcement for System z services, users and resources are offered. These capabilities can automatically detect, collect, analyze and send alerts for security-related incidents and events, including from the IBM Remote Access Control Facility (RACF), business applications, middleware, data, network and systems. For end-to-end environments, the security offerings provide mainframe-level audit and compliance management across enterprise-wide services, users, and processes, for the whole IT infrastructure. SMCz enterprise IT security management extensively supports the following functions:

- **Setting-up, Removing, and Amending Authorized Enterprise Users:** User security administration, both on/for the host mainframe(s), and on/for other platforms within and beyond the enterprise.
- **User Authentication:** Ensuring full, rigorous authentication of all would-be enterprise systems users, who must only be permitted access when they are validated to be who they present themselves to be.
- **Security Compliance Monitoring:** Defending the enterprise by monitoring, tracking, alerting on, and fully investigating, all enterprise security breaches attempted anywhere on the entire enterprise network.
- **Security Auditing:** Providing extensive, security auditing and analysis capabilities that reliably ensure regulatory compliance, and full conformance with corporate security mandates.

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*The IBM System z mainframe itself has a superb record of accomplishment for its bulletproof, never-broken security.*

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The IBM System z mainframe itself has a superb record of accomplishment for its bulletproof, never-broken security. This reaches the Evaluation Assurance Level (EAL) Level 5 rating for z/OS Logical Partitions (LPARs), the highest rating attained by any general commercial system. It uses deeply-optimized and long-refined security capabilities, implemented at every level of

the System z stack, from the microprocessor chip and hardware system upwards, through all layers of its software stack, to achieve this legendary security reputation.

**Product View:** The main new and/or enhanced IBM Tivoli products delivering and supporting these SMCz IT Security Management function capabilities from mid-2008 are:

- **System z LDAP Directory Options:** System z LDAP directory servers are accessed by other System z security products in order to authenticate users, for security administration/maintenance, etc. Several options exist:
  - **IBM Tivoli Directory Server (ITDS) for z/OS V6.1:** New-generation, mainstream native z/OS LDAP directory server, using DB2, Resource Access Control Facility (RACF) and z/OS UNIX data stores, running within the z/OS environment. This LDAP server will receive all future IBM z/OS LDAP enhancement effort. Base z/OS component. z/VM and System z Linux versions are also offered.
  - **IBM z/OS Integrated Security Services (ISS) LDAP Directory (“z/OS LDAP”):** Heritage z/OS LDAP server, no longer being enhanced, supports RACF & DB2 data stores. Base z/OS component. Superseded by ITDS above, but some copies may still be in use.
  - **IBM Tivoli Directory Integrator (ITDI) for z/OS V6.1:** z/OS-specific ITDI implementation. ITDI is a powerful generic data integration tool designed to move, transform, harmonize, propagate, and synchronize data across otherwise incompatible systems, including applications, directories, and databases. It is suitable for diverse problems otherwise needing complex custom coding and much more time/resource with other tools. Here used for identity information integration.
  - **IBM Tivoli Directory Integrator for System z Linux V6.1:** As above for System z Linux.
- **IBM Tivoli Identity Manager (ITIM for z/OS) for z/OS V5.0:** ITIM (a foundation IBM Tivoli security product) provides a secure, automated and policy-based user management solution to help manage user accounts, access permissions, and passwords from their creation to their termination across the IT environment effectively/efficiently. ITIM for z/OS leverages the availability, scale, and performance of the IBM System z mainframe to provide a centralized hub for identity management on z/OS: V5.0 added significant new capabilities. GA August 1 2008. **ITIM for System z Linux V5.0** is also available.



- **IBM Tivoli Access Manager (ITAM) for e-business for System z Linux V6.0:** The ITAM family (*foundation IBM Tivoli security product family*) helps the enterprise effectively manage access to its business-critical applications and data, and provides users fast, convenient access to the information they need. ITAM for e-business for System z Linux provides centralized authentication and access control services for Web resources, systems and hosted applications on System z (*on z/OS & Linux*). Another ITAM family member also relevant to System z users is:
  - **IBM Tivoli Access Manager for Operating Systems (ITAM for OS) for System z Linux V6.0:** Adds the required, enhanced operating system-level security needed to strengthen native Linux on System z security for enterprise-class usage.
- **IBM Tivoli Federated Identity Manager (ITFIM) for z/OS V6.2:** Provides a simple, user-centric, loosely-coupled model for managing identity and access to IT resources that span companies, and/or security domains. Essential for cross-company, ecosystem-collaborative applications security. Provides, federated single sign-on to securely share information between trusted partners, and to simplify application integration using open standards for Service Oriented Architecture (SOA) and Web services deployments, across distributed portal and mainframe environments. **ITFIM for System z Linux V6.2** is also available.
- **IBM RACF:** RACF protects all vital mainframe resources, and controls what users can do on the mainframe operating systems. A major part of the IBM SecureWay Security Server for z/OS and z/VM. (*New-name bundle including RACF*) This long-standing mainframe security foundation is well known, much respected, and needs no further review. See also zSecure Suite.
- **IBM Tivoli zSecure Suite (for z/OS) V1.9.1:** Modular mainframe security suite, the components of which help to simplify and speed-up mainframe security administration, audit usage and configuration. They help customers to enforce security policy compliance, to monitor usage, and to audit incidents, in order to detect and prevent security exposures. They also automate routine administrative tasks for the mainframe, helping to reduce costs and improve productivity. zSecure can seamlessly integrate with enterprise-wide security audit and compliance efforts. It also provides key Reliability, Availability, and Serviceability (RAS) functions, including error log integrity and data collection resiliency. GA December 14<sup>th</sup> 2007. (*From IBM's Consul acquisition.*)
- **IBM Tivoli Compliance Insight Manager (ITCIM) Enabler for z/OS V8.5:** Compliance software tool providing visibility of the organization's security compliance posture with its acceptable-use, and enterprise security, policies. ITCIM provides automated, enterprise-wide, and mainframe-user activity monitoring across heterogeneous systems. Includes dashboard views/reporting that measures the enterprise's security posture, and responds to security auditor requests. The "ITCIM Enabler for z/OS" component provides event source connection from zSecure Suite (*above*) to supply mainframe security event information into the enterprise ITCIM tool. ITCIM GA January 24<sup>th</sup> 2008. (*Main tool is a Windows server.*)
- **IBM Tivoli Security Operations Manager (ITSOM) V4.1:** ITSOM is a centralized security information event manager that helps enterprises improve the effectiveness, efficiency, and visibility of their security operations. ITSOM centralizes and stores security data from across the technology infrastructure, allowing automation of log aggregation and correlation. It can receive data from z/OS forwarded syslog, Simple Mail Transfer Protocol (SMTP) messages, and Simple Network Management Protocol (SNMP) traps. The tool allows security incidents to be automatically analyzed, recognized, investigated, and responded to, much faster and more consistently. It also streamlines incident tracking and handling, whilst also enabling the monitoring and enforcement of security policy. GA December 14<sup>th</sup> 2007. (*Linux, UNIX distributed server product only.*)
- **IBM Tivoli Security Information and Event Manager (ITSIEM) V1.0:** Centralizes security event and compliance policy management, providing visibility to the enterprise-wide security posture that includes centralized log management, event correlation, policy compliance dashboards, and comprehensive reporting capabilities. **Note:** ITSIEM combines the ITCIM and ITSOM products, discussed above, to provide a comprehensive solution for Security Information and Event Management (SIEM). GA January 21<sup>st</sup> 2008. (*Distributed/Windows server products.*)
- **IBM Tivoli Security Compliance Manager (ITSCM) (System z Linux client only) V5.1:** Identifies security vulnerabilities and security policy violations to protect business (*of all sizes*) against vulnerable software configurations by defining consistent security policies and monitoring compliance of these defined security policies. The tool automates scans of servers and desktop systems. It also integrates with other IBM Tivoli automated security management tools to help mediate security policy violations and risks. (*Distributed server product.*)

**Analyst Comment:** The IBM Tivoli security management portfolio on and for System z has greatly expanded over recent years, and now provides extensive, comprehensive, and advanced enterprise security capabilities via the combined main products assessed above. These now wrap and simplify the native, core, System z RACF security administration capabilities (*zSecure Suite*) and closely-couple the well-established foundation IBM Tivoli identity and access management products, including the best-in-class **IBM Tivoli Identity Manager**, and **IBM Tivoli Access Manager** family, on/for System z environments. To these powerful security management foundations, IBM Tivoli has now added extensive, higher-level enterprise security compliance management, security event monitoring, and security auditing/reporting capabilities, detailed under ITCIM, ITSOM, ITSEIM and ITSCM descriptions above. All these now fully cover the z/OS, and zLinux mainframe environments. Strong security support (*only partly noted above*) is also provided for z/VM environments. These (*and several other*) extensive IBM Tivoli security management capabilities strongly equip SMCz to serve as an enterprise-wide security management hub.

## IBM Service Management Center for System z – Main Products/Solutions – August 2008

<b>1. SMCz IT Process Management Solutions</b> <i>(ISM &amp; SMCz products, ITIL supporting)</i>	<ul style="list-style-type: none"> <li>• IBM Tivoli Service Request Manager (<i>ITSRM</i>) V7.1.</li> <li>• IBM Tivoli Release Process Manager (<i>ITRPM</i>) for System z Linux V7.1.1.</li> <li>• IBM Tivoli Business Continuity Process Manager (<i>ITBCPM</i>) for System z Linux V7.1.</li> <li>• IBM Tivoli System Automation Application Manager (<i>ITSAAM</i>) (for z/OS or zLinux) V3.1</li> <li>• IBM Tivoli Availability Process Manager (<i>ITAPM</i>).</li> <li>• IBM Tivoli Capacity Process Manager (<i>ITCPM</i>).</li> <li>• IBM Tivoli Storage Process Manager (<i>ITSPM</i>) V6.2.1.</li> <li>• IBM Tivoli Business Service Manager (<i>ITBSM</i>) V4.1.</li> <li>• IBM Tivoli Unified Process Composer (<i>ITUPC</i>) V7.1. Workstation-based tool/editor product.</li> <li>• IBM Tivoli Unified Process (<i>ITUP</i>) V7.1.1. (Free, read-only). Workstation content and knowledge product.</li> <li>• IBM OPAL – Open Process Automation Library</li> </ul>
<b>2. SMCz IT Service Management &amp; Process Automation</b>	<ul style="list-style-type: none"> <li>• IBM Tivoli Service Request Manager (<i>ITSRM</i>) for V7.1.</li> <li>• IBM Tivoli Application Dependency Discovery Manager (<i>ITADDM</i>) for System z Linux V7.1.</li> <li>• IBM Tivoli Change &amp; Configuration Management Database (<i>ITCCMDB</i>) for System z Linux V7.1.1.</li> <li>• IBM Tivoli Enterprise Portal (<i>ITEP</i>) V6.2.</li> <li>• IBM Tivoli Business Service Manager (<i>ITBSM</i>) V4.1.</li> <li>• IBM Maximo Asset Management V7.1.</li> <li>• IBM Tivoli Service Management Platform. (<i>ITSRM, ITADDM, ITCCMDB, &amp; ITBSM together</i>.)</li> </ul>
<b>3.1 SMCz IT Financial Management</b>	<ul style="list-style-type: none"> <li>• IBM Tivoli Asset Management (<i>ITAM</i>) for IT for System z Linux V7.1.</li> <li>• IBM Tivoli Usage and Accounting Manager (<i>ITUAM</i>) z/OS Option V7.1.</li> <li>• IBM Tivoli Decision Support (<i>ITSDS</i>) for z/OS V1.8.</li> <li>• IBM Tivoli License Compliance Manager (<i>ITLCM</i>) for z/OS V4.3.</li> <li>• IBM Tivoli License Compliance Manager (<i>ITLCM</i>) for System z Linux V4.3.</li> <li>• IBM Tivoli Contract Compliance Manager (<i>ITCCM</i>) V3.7.2.</li> </ul>
<b>3.2 SMCz IT Mainframe-centered Security Management</b>	<ul style="list-style-type: none"> <li>• IBM Tivoli Directory Server (<i>ITDS</i>) for z/OS, zLinux, &amp; zVM V6.1.</li> <li>• IBM Tivoli Directory Integrator (<i>ITDI</i>) for z/OS &amp; System z Linux V6.1.</li> <li>• IBM Tivoli Identity Manager (<i>ITIM</i>) for z/OS V5.0.</li> <li>• IBM Tivoli Identity Manager (<i>ITIM</i>) for System z Linux V5.0.</li> <li>• IBM Tivoli Access Manager (<i>ITAM</i>) for e-Business for System z Linux V6.0.</li> <li>• IBM Tivoli Access Manager (<i>ITAM</i>) for Operating Systems for System z Linux V6.0.</li> <li>• IBM Tivoli Federated Identity Manager (<i>ITFIM</i>) for z/OS V6.1.</li> <li>• IBM Tivoli Federated Identity Manager (<i>ITFIM</i>) for System z Linux V6.1.</li> <li>• IBM Tivoli Compliance Insight Manager (<i>ITCIM</i>) Enabler for z/OS V8.5.</li> <li>• IBM Remote Access Control Facility (<i>RACF</i>) family on z/OS, zVM.</li> <li>• IBM Tivoli zSecure Suite. (Supports z/OS, zVM, CICS, RACF V1.9.1.)</li> <li>• IBM Tivoli Security Operations Manager (<i>ITSOM</i>) V4.1.</li> <li>• IBM Tivoli Security Information and Event Manager (<i>ITSIEM</i>) V1.0. (Combines <i>ITSOM</i> &amp; <i>ITCIM</i>.)</li> <li>• IBM Tivoli Security Compliance Manager (<i>ITSCM</i>) V5.1.</li> </ul>
<b>3.3 SMCz Mainframe-centered Operations &amp; Production Control</b>	<ul style="list-style-type: none"> <li>• Tivoli Enterprise Portal (<i>ITEP</i>).</li> <li>• IBM Tivoli Workload Scheduler (<i>ITWS</i>) for System z Linux V8.4.</li> <li>• IBM Tivoli Workload Scheduler (<i>ITWS</i> for z/OS) for z/OS V8.3.</li> <li>• IBM Tivoli Workload Scheduler (<i>ITWS</i>) for Applications (for z/OS &amp; zLinux) V8.4.</li> <li>• IBM Tivoli Dynamic Workload Broker (<i>ITDWB</i>) V1.2.</li> <li>• IBM Tivoli Workload Scheduler for Virtualized Data Centers (<i>ITWS</i> for <i>VDC</i>). (<i>AIX, Linux</i>.)</li> <li>• IBM Tivoli Workload Scheduler LoadLeveler (<i>ITWLS</i>). (<i>AIX, Linux</i>.)</li> <li>• IBM Tivoli System Automation (<i>ITSA</i>) for z/OS V3.2.</li> <li>• IBM Tivoli Systems Automation (<i>ITSA</i>) for IOM V2.1.</li> <li>• IBM Tivoli System Automation (<i>ITSA</i>) for Multiplatforms.</li> </ul>
<b>3.4 SMCz Mainframe-centered Performance Monitoring &amp; Management</b>	<ul style="list-style-type: none"> <li>• IBM Tivoli OMEGAMON XE family, most for z/OS, most V4.1.0. (IBM brand for System z PA/PM. Long list.)</li> <li>• IBM Tivoli Monitoring (<i>ITM</i> family) V6.2. (Core technology and products for distributed platforms, also in above.)</li> <li>• IBM Tivoli Performance Analyzer (<i>ITPA</i>) V6.1.</li> <li>• IBM Tivoli Composite Application Manager (<i>ITCAM</i>) family:             <ul style="list-style-type: none"> <li>◦ IBM Tivoli Composite Application Manager for SOA V7.1.</li> <li>◦ IBM Tivoli Composite Application Manager for Internet Service Monitoring V6.1.</li> <li>◦ IBM Tivoli Composite Application Manager for Response Time Monitoring V6.2.</li> </ul> </li> <li>• IBM Tivoli NetView (<i>ITN</i>) (for z/OS) V5.3.</li> <li>• IBM Tivoli NetCool/OMNIBus family.</li> <li>• IBM Tivoli Information Management (<i>ITIM</i>) for z/OS V7.1.</li> <li>• IBM Tivoli Web Access for Information Management (<i>ITWAIM</i>).</li> <li>• IBM Tivoli Event Pump for z/OS V4.2.</li> </ul>

Shows most main IBM Tivoli SMCz-related products/solutions as at August 2008, including those reviewed in this White Paper. Not exhaustive.  
 VX.Y = latest version available or due, if so labeled.  
 (ITXXM) = Our product name abbreviation, from name word first letters.  
 "Platform" is often a complex topic for multi-component SM tools. (E.g. client, agent, server, data aggregation point, control point, report server etc.)  
 Chart is System z-focused but not exclusively so.

Figure 17: IBM Service Management Center for System z Products – August 2008

### 3.3. SMCz Operations & Production Control Domain

**Overview:** Operations and Production Control teams are concerned with the operational delivery of business and IT services, and with the smooth running of all planned/scheduled/additional workloads, across the whole IT infrastructure (*Including the System z mainframe*). They also exercise operational control over the actual enterprise IT physical infrastructure. They therefore need strong visibility and control over all workloads, schedules, related operational events, and over all main infrastructure components.

**Functional View:** Amongst the specific Operations and Production Control functions that these teams must today now support, usually across the enterprise's mixture of mainframe and heterogeneous distributed server environments, are included:

- **Console and Server Systems Operations:** Managing the System z mainframes, Sysplexes, and the heterogeneous distributed server platforms, in use across the enterprise themselves in live operations. Now includes extensive management of virtualized environments, including System z LPAR and z/VM hypervisors, and other platform virtualizers such as VMware (x86/x64). (*Using specific mainframe and server management tools offered, including IBM Systems Director, see Appendix A for more details.*)
- **Workload, Job, and Output Scheduling:** Today's complex, heterogeneous IT environments present demanding workload, job and output scheduling requirements that include, but are a further step beyond, the already-sophisticated scheduling and workload management capabilities that had evolved on the mainframe platform. (*See below.*)
- **System Automation:** New/improved workflow and additional process developments including refinement, testing, and deployment of extended automation of production operations processes. (*See below.*)
- **Network Management:** Day-to-day operational network management of the enterprise network, normally Transmission Control Protocol/Internet Protocol (TCP/IP) today, and of all the associated networking equipment and software needed. Especially challenging for network service provider enterprises, requiring additional specialized capabilities.
- **Storage Management:** Extensive range of day-to-day operational storage management tasks and functions, ranging from baseline storage systems hardware management (*typically using IBM TotalStorage Productivity Center, see Appendix B for more details*), up through the higher layers of enterprise storage management. Today must also include the management of virtualized storage environments. (*E.g. IBM Storage Area Network (SAN) Volume Controller (SVC).*)
- **Production Job, Application, or Workload Troubleshooting:** Identifying any failures or errors in job, application or workload completion/processing, the investigation and diagnosis of what when wrong, the resolution of the issues, recovery, and rerunning to complete. (*Often in conjunction with Technical Support/Services teams.*)

**Product View:** IBM Tivoli SMCz Operations and Production Control solutions establish control over the process of delivering mission-critical workloads and services through automation, and by making applications, subsystems, and systems highly available. These solutions automate many manual activities, tasks, and operations. Improved business agility is provided via this advanced automation, which enables integrated plans and schedules for business and IT processes, as well as IT resources, to be created and run. Complex production scenarios can be readily implemented, such as starting up, shutting down, or moving applications and subsystems, based on business process schedules and plans. Consolidated events, as well as system and workload automation solutions, all use the IBM Tivoli Enterprise Portal as their common, customizable User Interface (UI). The main new and/or enhanced IBM Tivoli products directly supporting these SMCz Operations Management and Production Control functions for, from, and around System z are:

- **IBM Tivoli Enterprise Portal (ITEP) V6.1:** The unified ITEP delivers consolidated Graphical User Interface (GUI) operations views and dashboards, supporting the mainframe operations and production control teams with their system automation and workload scheduling efforts. It also presents all systems monitoring (*from Omegamon and ITCAM mainframe products in our SMCz context, discussed below*).
- **IBM Tivoli Workload Scheduler (ITWS) for System z Linux V8.4:** Service-based workload automation solution that uses business policies to aggregate and centrally-manage cross-enterprise, heterogeneous, composite workloads to meet business goals and service levels. It integrates/aligns a mix of mainframe and distributed workloads into enterprise-level business services, exploiting the IBM Tivoli enterprise-level workload automation backbone.
- **IBM Tivoli Workload Scheduler (ITWS) for z/OS V8.3:** Provides enhanced enterprise-wide workload planning with integrated scheduling, and a single point of control for cross-enterprise operations from z/OS. Extensive integrations with ITWS above, WLM, ITSA for z/OS, and ITEP. GA December 15<sup>th</sup> 2006.
- **IBM Tivoli Workload Scheduler for Applications (ITWS for Applications) for z/OS & zLinux V8.4:** Extend the powerful workload automation capabilities of ITWS to Enterprise Resource Planning (ERP) systems, including SAP, Oracle and PeopleSoft. It provides dynamic, service-driven execution of ERP workloads with high scalability, fault tolerance and workload restart processes, audit control and reporting; thus integrating ERP systems into ISM and SMCz. GA December 4<sup>th</sup> 2007.

- **IBM Tivoli Dynamic Workload Broker (ITDWB) V1.2:** Transforms static IT scheduling networks into dynamic, virtualized environments by dynamically routing workloads to the best available resources. Modular and scalable up to 100K+ workloads per day. (*Distributed platforms.*)
- **IBM Tivoli Workload Scheduler for Virtualized Data Centers (ITWS for VDC):** Extends IBM Tivoli workload automation to grid application environments. (*Linux & AIX.*)
- **IBM Tivoli Workload Scheduler LoadLeveler (ITWSL):** Job management system for high-performance computing grids, schedules to run more parallel job workloads in less elapsed time. (*Linux & AIX.*)
- **IBM Tivoli System Automation for z/OS (ITSA for z/OS) V3.2:** Ensures mission-critical applications and middleware attains high availability, on single IBM z/OS systems and on Parallel Sysplex clusters, through advanced policy-based, end-to-end automation, including Input/Output (I/O), processor and system operations. ITSA for z/OS includes out-of-the-box automation for IMS, Customer Information Control System (CICS), ITWS, DB2, mySAP & WebSphere. Crucially eases the mainframe management effort needed and minimizes operational costs. GA December 14<sup>th</sup> 2007.
- **IBM Tivoli Systems Automation for IOM (ITSA for IOM) V2.1:** Provides outboard automation, communication and integration with mainframe automation and monitoring tools and distributed systems, over the TCP/IP network or dial-up. It delivers secure remote access to mainframe and distributed systems regardless of location, and can also automate the tasks a z/OS-based system cannot itself initiate.
- **IBM Tivoli System Automation (ITSA) for Multiplatforms:** Provides higher availability, prevents services disruptions, and brings policy-based automation, to important enterprise applications, IT services, and middleware, running on heterogeneous (*distributed*) platforms and virtualization technologies.

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*These IBM Tivoli SMCz Workload Scheduling capabilities provide the industry's most powerful, and most comprehensive, enterprise workload management and scheduling capabilities.*

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**Analyst Comment:** These IBM Tivoli SMCz Workload Scheduling capabilities provide the industry's most powerful, and most comprehensive, enterprise workload management and scheduling capabilities. They are centered on the System z mainframe in its SMCz role, but also strongly embrace distributed platforms, and are integrated under the common ITEP portal UI to display scheduling and job information. The mature, refined, extensive systems automation also supported

on System z, by the products outlined above, is also a crucial enabler of the SMCz role's high productivity and cost savings when managing workloads/jobs end-to-end across the enterprise.

### 3.4. SMCz System Monitoring & Performance Management

**Overview:** This final domain establishes visibility into the performance of IT resources, including applications, subsystems, critical workloads, and business services, as well as into the underlying enterprise systems, storage, and network hardware. It also provides event correlation and contextual information for enterprise-wide incidents and event management.

**Functional View:** Monitoring, analyzing, and managing the performance and availability of IT system resources, assets, applications, and now also of enterprise business services, are crucial operational management tasks for every enterprise IT organization. Ensuring the availability of these by proactively managing, investigating, and resolving issues arising from the stream of monitoring events/alerts generated is a crucial task. Operations and technical support staff, from several disciplines – including operators, Database Administrators (DBAs), application analysts, performance/capacity planning specialists, middleware experts, and server and storage specialists – are all involved in diverse aspects of overall enterprise Performance Analysis/Performance Monitoring (PA/PM). However, managing individual IT resource silos in isolation is no longer sufficient, for the reasons discussed earlier.

By contrast, SMCz offers an integrated, end-to-end, business services-focused, performance monitoring and management approach for the enterprise, taking full advantage of powerful, native, System z PA/PM capabilities, but also bringing together all enterprise-wide PA/PM and event data onto this powerful hub platform. This offers much greater control over incident and availability management, and allows more proactive automation. This includes initiating incident resolution and recovery processes, raising alerts with contextual information that reduce mean-time-to-resolution, while ensuring service delivery continues to meet SLA levels throughout. Management and Operations dashboards can be customized to provide appropriate views for subject matter experts to quickly source and resolve problems, all using a common GUI – the IBM Tivoli Enterprise Portal. So typical functional responsibilities here include:

- **Performance Monitoring and Analysis:** Both on the mainframe, and across all enterprise business services, composite applications, other system platforms, subsystems, and middleware servers, etc.
- **Availability Management:** Responding effectively to events and alerts from the various levels of monitoring, filtering, correlating and consolidating events, conducting diagnosis and root-cause analysis, correcting detected issues, and/or performing timely recovery processes to restore services, to attain and maintain the availability standards needed.

- **Portal/Dashboard Displays for Visibility:** With so many elements to be monitored and managed across the enterprise, and given the large volume of monitoring and events information, a centralized, consolidated, highly-visual set of management and operational dashboards are needed to provide clear visibility into the infrastructure.
- **Trend Analysis, Capacity Planning, Capacity on Demand (CoD):** Assessing actual asset capacity usage rates and peaks, planning and analyzing future workloads growth and change, and preparing capacity plans and increments for all constrained IT resources, in order to be able to continue to maintain service levels. Today, this will now often involve exploiting CoD facilities, or drawing on supplementary out-of-house computing services (*now including Cloud Computing*), to respond quickly enough to fast-changing business needs.
- **Database Administration:** Including database performance management, database tuning and optimization, and database application and server issue resolution. (**Note:** *DB2's extensive autonomic capabilities greatly reduce the efforts needed in these areas, and IBM's comprehensive portfolio of DB2 (and IMS) database tools provide extensive tooling support for all DBA tasks.*)
- **Network Management:** Traditional network management of the enterprise TCP/IP network, and networking equipment, switches, and routers, etc., including network performance monitoring, network capacity and bandwidth management, and network event and alert management, etc.
- **Application Problem Determination:** To investigate, analyze (*including abend analysis*), troubleshoot and diagnose faults, in order to resolve issues, and to tune/optimize mainframe applications, etc.

**Product View:** A range of newer/enhanced IBM Tivoli products, most under the categories of performance monitoring and performance management, supports these areas. These include:

- **IBM Tivoli OMEGAMON XE family, most for z/OS, and most at V4.1.0 release level:** The latest versions of IBM's extensive, generic brand name family of advanced, mainframe subsystem-centered PA/PM tools, heavily developed by IBM from its Candle Corporation acquisition assets, and now embedding IBM's advanced autonomic monitoring technologies. OMEGAMON XE prefix-named mainframe monitoring offerings include products for: z/OS; CICS; CICS Transaction Gateway; IMS; Storage on z/OS; DB2 Performance Expert on z/OS; DB2 Performance Monitor on z/OS, z/VM and Linux; and Mainframe Networks.
- **IBM Tivoli Monitoring family V6.2:** The latest version of IBM's PA/PM/monitoring product family for distributed platforms, including Windows, main UNIX, and main Linux operating systems. Based on the same, common, IBM Tivoli advanced monitoring technology as used in the OMEGAMON XE brand product family for System z mainframes discussed above.
- **IBM Tivoli Performance Analyzer (ITPA) V6.1:** Adds predictive/forecasting capability to IBM Tivoli Monitoring (*ITM*), enabling focus on future performance issues in distributed environments, using existing ITM agents, and integrated within the ITEP.
- **IBM Tivoli Composite Application Manager (ITCAM) for XYZ family:** Sophisticated monitoring and performance management solutions for modern SOA, Web services and other multiplatform applications. Actual ITCAM "for XYZ" family implementations include:
  - **ITCAM for SOA V7.1:** Designed specifically for SOA, this composite application management tool monitors, manages, and controls the Web services layer of IT architectures. The tool can identify sources of bottlenecks/failures, and can pinpoint which services are using most resources.
  - **ITCAM for Internet Service Monitoring V6.0.01:** Tests/monitors Internet services from a user perspective. Includes a highly scalable, 23 monitors suite, to measure services availability, performance, and content, through periodic polling from distributed points of presence.
  - **ITCAM for Response Time Monitoring V6.2:** End-to-end transaction management solution that monitors end-user response time, helping visualize transaction paths through application systems, and showing response-time contributions of each step.
- **IBM Tivoli NetView (ITN) (for z/OS) V5.3:** Long-established, host-based enterprise network management tool suite.
- **IBM Tivoli Event Pump for z/OS V4.2:** Extends monitoring/management of z/OS-based systems, integrating z/OS subsystem information (*on z/OS, CICS, IMS, DB2, and ITSA events*) to give one enterprise-wide view of all mainframe events/status. This stream is then fed into the business service views of IBM Tivoli Business Service Manager (*ITBSM*), rounding out/completing its now-unique z/OS capabilities. It also feeds into event consolidation with the IBM Tivoli Netcool/OMNIBus Object Server.
- **IBM Problem Determination Tools (PDT) Suite for z/OS:** Strong suite of integrated tools for z/OS problem determination and resolution on mainframe applications. Our in-depth 2007 White Paper on z/OS PDT suites compared IBM's PDT suite versus its competitors. (*See page 81, item 6.*)

**Analyst Comment:** IBM has built-out an unrivalled, comprehensive, advanced, and well-integrated SMCz portfolio of performance management systems covering every aspect of System z (*OMEGAMON XE*) and distributed platforms (*IBM Tivoli Monitoring*) resources, and all aspects of enterprise composite applications, performance monitoring and performance analysis. These all feed into SMCz's central ITEP portal common interface, thus enabling centralized, enterprise-wide performance management. Extensive enterprise IP network management capabilities are now also provided within SMCz by the traditional ITN (*on z/OS*) and the new IBM Tivoli Netcool/OMNIBus family.

## SMCz's Extensive Integration Crucial Enabler

Crucially central to SMCz's centralized ESM power is the extensive, in-built, standard integrations that IBM Tivoli has now provided, between these IBM Tivoli tools, to/from other related tools, and to core platform systems and subsystems. Many scores of these standard integrations/interfaces now interconnect the above IBM Tivoli tools to other relevant tools within the same domain, but also across the three SMCz architectural layers/other domains. This enables the cohesive, centralized, interconnected, end-to-end ESM approach that SMCz uniquely delivers.

We mention and explain many of these standard, inter-product integration facilities in our Appendix C product assessments (*on page 62*). The IBM Tivoli Enterprise Portal, for example, not only provides "single-pane-of-glass" visibility into all enterprise-wide performance monitoring and event information, but is now fully integrated to centrally-display enterprise job scheduling/workload management information and also all SMCz security compliance/incident management data. Not only this, but most IBM Tivoli tools also offer many additional user options, Application Programming Interfaces (APIs), and similar facilities, to allow users to easily build additional custom integrations to meet their own, more specific local needs. The IBM Tivoli portfolio's extensive support for a **wide gamut of open industry standards** greatly aids and facilitates this. Finally, the extensive **IBM Tivoli OPAL (Open Process Automation Library) of validated pre-built integrations now offers over 900 additional, specific solutions** contributed by IBM Tivoli and business partners that are readily available to customers via the OPAL Web site.

## SMCz Exploits Linux on System z – Excellent Choice

IBM has, wisely in our assessment, brought out SMCz core products for the System z Linux operating environment. We think this makes complete sense for customers, and is an excellent choice for the System z operating environment that is best suited to run new SMCz service management and process automation workloads. The reasons we strongly favor this choice are:

- **Faster Software Porting to zLinux:** Choosing zLinux as the SMCz System z target operating environment considerably simplified and speeded-up IBM's porting, conversion, and testing of SMCz products from distributed environments to the mainframe initially, and will do the same for all future additions. System z Linux is so closely similar to Linux on other platforms, and (*like those*) has close affinity to major UNIX versions. It is thus a far easier, faster software porting and testing task to bring an existing software product up on System z Linux than onto the architecturally-different, and more rigorously-controlled, z/OS environment. This means that both new releases, and additional future SMCz products, will reach mainframe users faster, and IBM's costs will be lower – which may be reflected in product/support pricing.
- **zLinux Economics Favorable for SMCz:** Running zLinux workloads, such as the new SMCz process automation functions for enterprise-wide service management, on Integrated Facility for Linux (IFL) specialty processor engine(s) on System z provides much the lowest-cost mainframe processing-capacity environment, without driving-up mainframe software costs. This enables SMCz workloads to be processed at highly-competitive operational processing costs, using a small fraction of the capacity of a (*usually existing*) mainframe, for all the business services in the enterprise. This needs little extra operational staffing, and runs these ESM workloads at the lowest possible TCO, floor-space, and electrical power and cooling cost.
- **Strong SMCz Workload Isolation:** We think it operationally sensible for mainframe users to run these new mainframe ESM hub SMCz process automation workloads on a System zLinux LPAR partition and/or on a z/VM Linux virtual server. There, these functions can run safely, completely segregated and securely isolated from existing enterprise, mission-critical, production On-Line Transaction Processing (OLTP) mainframe workloads using DB2, CICS, or IMS, running in flagship z/OS operating environment LPARs. These new mainframe SMCz workloads therefore cannot affect core mainframe production applications, because rock-solid, secure System z LPAR virtualization ensures complete isolation to the industry's highest standard.
- **System z Linux-z/OS Close Coupling:** With close co-resident proximity on the same System z machine, users can exploit the mainframe's excellent, low-latency cross-subsystem "inside-the-box" communications. Using these, easy and fast integration/networking can readily be established/leveraged between the SMCz components running in System z Linux, with the operational management tools and subsystems in a z/OS environment. This provides high performing, ultra-robust, easily-managed, and centralized ESM, all inside the one mainframe, with much-superior performance that no complex distributed implementation could ever provide/equal.
- **Will Further Boost Already-high System z Linux Adoption:** The adoption of Linux on System z mainframes is already widespread, with over 2,500 installations running today. These are supporting the other new-to-mainframe, Linux-based workloads discussed in Section 3 (*around Figure 5 on page 18*). Existing zLinux adopters will welcome this important new ESM hub role being hosted on System z Linux. They are already familiar with the strong benefits of the platform, already have System z Linux skills, and will find SMCz an excellent fit of into their zLinux environment. It will also bring many hundreds of new SMCz-adopting customers into the System z Linux fold, boosting the uptake of that platform on the mainframe still more widely over the next several years.

These, we concluded, are compelling advantages of using zLinux to run the new core SMCz workloads on System z.

## Extensive IBM Best Practice Experience Supports SMCz

IBM offers extensive best-practices service management process content, proven process workflows, plus governance guidance, for SMCz and ISM implementations, whether for System z alone or for enterprise-infrastructure-wide service management deployments. These are delivered in the forms of the ITUP tool (*discussed above*), through standardized scenarios (*see subsection below*), through the IBM OPAL library of integrations available, and through the range of associated IBM Global Services (IGS) professional services for service management now offered (*see example below*). These guidelines and professional services were built and refined by IBM's extensive, real-world systems and service management implementation experience helping many hundreds of customer sites. In addition, running and optimizing IBM's own, massive, 17,000 server, 7 data-center, 350,000 end-user-supporting IT operations, that serve both its own business needs as well as those of hundreds of IBM's outsourced IT processing customers, added formidable inputs to this deep pool of expertise.

## Where to Start with SMCz? Five Service Management Entry Points

Wide IBM practical experiences at hundreds of customers defined five popular SMCz service management flexible entry points, each with appropriate starter projects also defined. These modular, flexible entry points, and their starter projects, each allow rapid implementation, bringing fast Return On Investment (ROI) payback for their relatively modest investments. They allow the enterprise to manage its transformation to full enterprise-wide service management in comfortable, discrete steps based on their more pressing business priorities, IT maturity, and technical expertise.

They therefore enable an incremental, low-risk deployment of SMCz/ISM to be adopted, without the “big-bang” change risks/fears. The entry-points may be “mixed-and-matched” to fit specific enterprise ITSM roadmap plans. These five, flexible entry points are:

- 1. Discover:** Discovery/mapping that uncovers in-place applications, IT infrastructures, their dependencies, and how their resources are currently used. This provides a vital foundation for problem, configuration, change, asset, and performance management, projects.
- 2. Monitor:** Monitoring resources, events, performance levels, and users, to achieve visibility into business service performance and availability, is the basis for event and performance management solution projects.
- 3. Protect:** Ensuring that service availability, including securing applications, data, and services, against fraudulent/malicious use, and improving resilience via backup/storage. Improving data backup, restore, and/or retention, are typical projects.
- 4. Industrialize:** Using automation to cut costs and errors, improve response and raise accuracy, to run more tasks without human oversight. Automation can be implemented in many infrastructure areas. Enterprise user Single Sign-On (SSO) is a popular starter example.
- 5. Integrate:** Improve business agility and process flexibility by managing/reporting on IT services from a business perspective, aiding IT planning/execution. Business service management is a high-return project here.

We warmly support this well-defined service management entry points approach (*with associated starter projects*) for the System z SMCz-adopting customer. We had observed that the similar approach, used at the heart of IBM's massive SOA initiative over the last three years, was hugely successful for SOA users (*and for IBM*), and expect the same to apply here with SMCz.

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*We warmly support this well-defined service management entry points approach...*

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## IBM's SMCz Scenarios Help Customers Speed Deployment

SMCz offers many possible solutions, each involving multiple IBM Tivoli products, many of which support several integration possibilities and workflows to achieve their designated tasks/roles. With so many IBM Tivoli SMCz-supportive products in the portfolio, the many standard integration links between them, and the still-larger number of other possible integration combinations, the total number of combined SMCz solutions possible runs into thousands, in theory.

To help customer adopters more quickly address their most pressing, current service management issues, IBM has defined and presents a compact range of **the most important, most common practical SMCz adoption scenarios**. Each of these scenarios characterizes the problem or issue addressed, defines the set of IBM Tivoli SMCz and linked products best used for a good solution, and defines how to choreograph these SMCz and other products together via the most appropriate integration links, to solve the issues addressed.

For example, a major IBM session – presented at IBM Tivoli Pulse 2008 – showed and explained **IBM's top six SMCz ESM scenarios** in considerable detail. These were:

- **Deploying an End-to-end SMCz Enterprise Solution for Business Service Management.**
- **Deploying an End-to-end SMCz Enterprise Solution for Enterprise Business Continuity Management.**
- **Deploying an End-to-end SMCz Enterprise Solution for Security Management.**
- **Deploying an End-to-end SMCz Enterprise Solution for Change and Configuration Management.**
- **Deploying an End-to-end SMCz Enterprise Solution Incident and Problem Management.**
- **Deploying an End-to-end SMCz Enterprise Solution for IT Financial Management.**

Taking the **Enterprise Business Continuity Management** scenario from the above as our illustrative example, the business challenge here is that IT is often accountable for the delivery of business services without having the tools to properly identify, implement and test recovery plans and processes. IT groups also have considerable difficulty in notifying the correct staff as to the scope and impact of outage situations. This SMCz scenario solution provides a pre-defined flow of tasks to develop and implement business services, IT asset, and data recovery strategies and plans. It provides guidance on analyzing outages, including impact and scope assessment, and on recovery, approval and notification processes. The scenario provides a consistent and integrated enterprise business continuity process, spanning all stages – identify, create, test, execute, and audit – of business continuity provision. The IBM Tivoli SMCz (*and System z*) products choreographed into this example scenario solution include:

- **IBM Tivoli Business Continuity Process Manager (ITBCM) for System z Linux V7.1** – Overall DR/BC process manager.
- **ITN (on z/OS) V5.3** – Enterprise network management product for network event detection and alerting.
- **IBM Tivoli System Automation (ITSA) for z/OS V3.2** – Mainframe operations automation workflow products.
- **GDPS** – Mainframe multi-site Parallel Sysplex cluster manager, with powerful DR/BC capabilities to provide recovery and continuity if primary site goes down.
- **IBM Tivoli System Automation for IOM (ITSAIOM) V2.1** – Generates alerts to appropriate IT staff, and notifications to business users.
- **IBM Tivoli Business Service Manager (ITBSM) V4.1** – Provides business impact and SLA views via real-time dashboard displays, traffic lighting etc.
- **IBM Tivoli Application Dependency Discovery Manager (ITADDM) for System z Linux V7.1** – Identify configuration drift histories, and dependencies.
- **IBM Tivoli OMEGAMON XE family products on System z** – Performance management, historical reporting and analytics.

This scenario solution improves the enterprise's ability to systematically plan, test and execute recovery processes based on the scope and impact on business service delivery of the outages concerned. The deployment of this scenario improves the enterprise's readiness for, and provides powerful insurance against, incidences and disasters.

These scenarios are therefore extremely helpful shortcuts, implementation accelerators, and solution roadmaps for customers that we warmly welcome and recommend. They help to quickly clarify how and where combinations of the extensive SMCz technologies can best be practically applied, to solve some of the most common and most important service management problems.

## **Closed-loop Service Management Improvement Cycle for SMCz Adopters**

As a process improvement-based discipline, ISM seeks to successively/continuously improve all enterprise ITSM processes in a continuing cycle without a specific end-point. From its extensive customer experience, IBM developed/refined (*for its ISM and SMCz adopter customers*) a six-step ESM improvement approach. IBM proposes SMCz adopters should apply these steps successively in an ongoing closed-loop cycle of improvement, as their implementation progresses. The six steps, in their simplest terms, are shown below:

1. **Monitoring** the service infrastructure.
2. **Measuring** the service customer's experience.
3. **Identifying** the service dependencies.



4. **Tracking business service** KPIs that truly reflect real business operational performance.
5. **Connecting** the business and IT operational service views.
6. **Supporting automated actions** in real time.

We consider this is a helpful, practical improvement model/approach that usefully guides SMCz adopters towards longer-term service management excellence, if steadily followed over a period of time. Evolution and steady incremental improvement at low risks, rather than revolutionary upheaval, is implicit in this approach and recommended by ourselves and IBM.

## New IBM Service Helps Enterprises Plan SMCz Rollout

Also announced at the IBM Tivoli Pulse 2008 conference was Big Blue's complementary new professional service, specially designed to help System z users to plan the best SMCz deployment for and across their enterprise. This was named the **IBM Architecture and Strategy Services for Tivoli Service Management Center for System z**. It comprises a five-day, onsite engagement that assesses the company's business priorities, and current mainframe applications, software, and hardware environments. It then recommends a detailed roadmap for the customer to best roll out SMCz-based ESM. The recommended roadmap may well utilize several of the flexible entry-points mentioned previously.

IGS also offers new Healthcheck services for service management, and enhanced IBM Event Management and Monitoring services, designed to help customers achieving service excellence through event automation and correlation.

### Our Analysis

SMCz brings an integrated implementation of ISM and process automation software to the System z mainframe for the first time, delivering service management capabilities that allow businesses to effectively manage large, complex, IT enterprises end-to-end. It also integrates numerous, well-proven, enhanced IBM Tivoli

operational system management, monitoring, automation, and security products for System z environments, with established ITIL best practices, together with associated IBM professional services. SMCz therefore now provides a complete implementation of ISM that can efficiently manage business services across the whole enterprise from a centralized System z mainframe hub.

SMCz thus enables enterprises to improve end-to-end business services quality, to sharply improve IT operations/business-user relations, and to cut "IT dead-money operating costs" via automation; all vital strategic advantages today. This is a truly radical advance over the old-style IT "resource silo" management that failed to address these crucial needs. SMCz's comprehensive IT financial management offering also brings cost reductions and better financial control of IT operations and resource usage, software, and contracts.

System z customers have long used the broad range of IBM Tivoli operational resource management tools to manage the operating system images/LPARs, System z subsystems, and middleware servers, running on their mainframes. These environments include varied combinations of z/OS, z/VM, zLinux, DB2, IMS, CICS, WebSphere Application Server (WAS), Unix System Services (USS), WebSphere MQ (WMQ), TCP/IP, RACF, and others. SMCz embraces, integrates, and extends these established operational System z resource management capabilities.

Overall, we found, SMCz brings System z customers **higher-visibility, better-controlled, and more fully-automated** management of all the business services provided across the enterprise; whether these actually run on distributed or mainframe platforms or a mixture of the two.

The six domains of SMCz software assessed above clearly show that IBM Tivoli has been hugely active in creating these powerful new SMCz ESM hub software capabilities, and in strongly enhancing/advancing the extensive range of SMCz-related mainframe

operational management software. Figure 17 on page 50 provided our helpful summary list (of most) of these SMCz-supporting products.

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*The pace and scale of IBM Tivoli System z development advances here has been massive.*

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The pace and scale of IBM Tivoli System z development advances here has been massive. For example, the brand released to GA/shipped a **staggering 32 new or enhanced IBM Tivoli operational system management products** for the System z mainframe and its flagship z/OS operating system **just in Q4 2007 alone!** (All publicly previewed at the 2007 SHARE mainframe user conference.) A high pace of further System z Tivoli product advances continued over 1H 2008, and is set to continue; with further SMCz additions expected over 2H 2008.

Many enterprises had experienced rapid expansion of their distributed Web applications in recent years. Large numbers of important new SOA composite applications have been deployed, often across mainframes and distributed platforms. Such new and extended/new mainframe workloads (*reviewed in Section 3*) have often been fast-growth workloads now generating high transaction volumes. Many of these therefore now need 24\*7\*365 availability and/or global accessibility, as well as requiring robust DR/BC coverage. Conventional silo resource management could not come near to meeting the management needs of such demanding environments.

These developments created major new ITSM challenges and demands, requiring more sophisticated, end-to-end business service management and process automation, with tools better geared to manage, monitor, support, secure, and optimize, complete business services that run over heterogeneous IT infrastructures, including the again-favored System z mainframe. SMCz now provides powerful, comprehensive, and industrial-strength, ESM solutions able to meet these challenges fully, and offers compelling benefits to adopters.

These benefits naturally include intrinsic mainframe new workloads QoS advantages, which include high hardware utilization, strongest security, higher availability, excellent applications and database serving capability, lowest TCO, lowest staffing levels, low power, cooling, and floorspace needs, etc. More specifically, using SMCz allows more IT operations to be consolidated, simplified, and be run on fewer servers or server images needed less resource to manage. It also eliminates the need for multiple operational management software solutions, with one end-to-end service management approach. It also automates repetitive tasks and processes, reducing errors and improving services, more easily handling future scaled-up workloads without needing much extra headcount. SMCz, with its strong operational management portfolio able to detect many triggering causes, also enables

enterprises to avoid many more outages, whilst recovering quicker from the fewer remaining via fast, automated response actions that minimize business impact. Finally, SMCz enables substantial improvements in DR/BC performance: the new ITBCPM offering helps users identify, create, test, execute and audit recovery plans for their business services, IT assets and data.

We assessed SMCz to be an impressive and comprehensive, industry-leadership service management solution set, taking

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*SMCz is a powerful, transformative new strategic solution set that we warmly commend to mainframe CIOs and IT operations executives, for the substantial business service and IT benefits that it offers.*

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excellent advantage of the new System z10 mainframe, the IBM Tivoli portfolio, and existing ISM strengths. SMCz is a powerful, transformative new strategic solution set that we warmly commend to mainframe Chief Information Officers (CIOs) and IT operations executives, for the substantial business service and IT benefits that it offers.

IBM is now also in a formidable position to seize global software/services market leadership in the large, rapidly-expanding EAM solution segment, concerned with improving the management of all enterprise assets, including non-IT assets (*with its extensive, leading-edge IBM Maximo EAM platform, industry solutions, products, and tools*). This important, strategic offering is unfortunately outside this White Paper's scope. EAM is a hugely important new class of "enterprise service" best performed for the whole global enterprise centrally. The unique QoS attributes of the System z mainframe ideally meet the hardware platform requirements for centralized, global, and large-scale EAM. Because IBM's EAM and SMCz centralized solutions share common IBM ITSMP process automation foundations, these are highly complementary major new mainframe roles.

## Appendix A: IBM Systems Director – Unified Server Manager Supports System z

### IBM Systems Director Overview

Crucially important to efficiently operating today's complex physical/virtual server platform environments are the vendor-provided foundation systems management software tools on offer. IBM Systems today offers a single, comprehensive, ultra-modern, and unified system management tool foundation suite, the capable "IBM Systems Director". This we assessed as an elegant and comprehensive systems manager, designed to manage both physical and virtual platforms, to manage servers, storage, and networking equipment, and that now supports all IBM server and storage systems, as well as most major third-party platforms. An overview of IBM Systems Director is shown in Figure A1 on the following page 59.

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*This we assessed as an elegant and comprehensive systems manager, designed to manage both physical and virtual platforms...*

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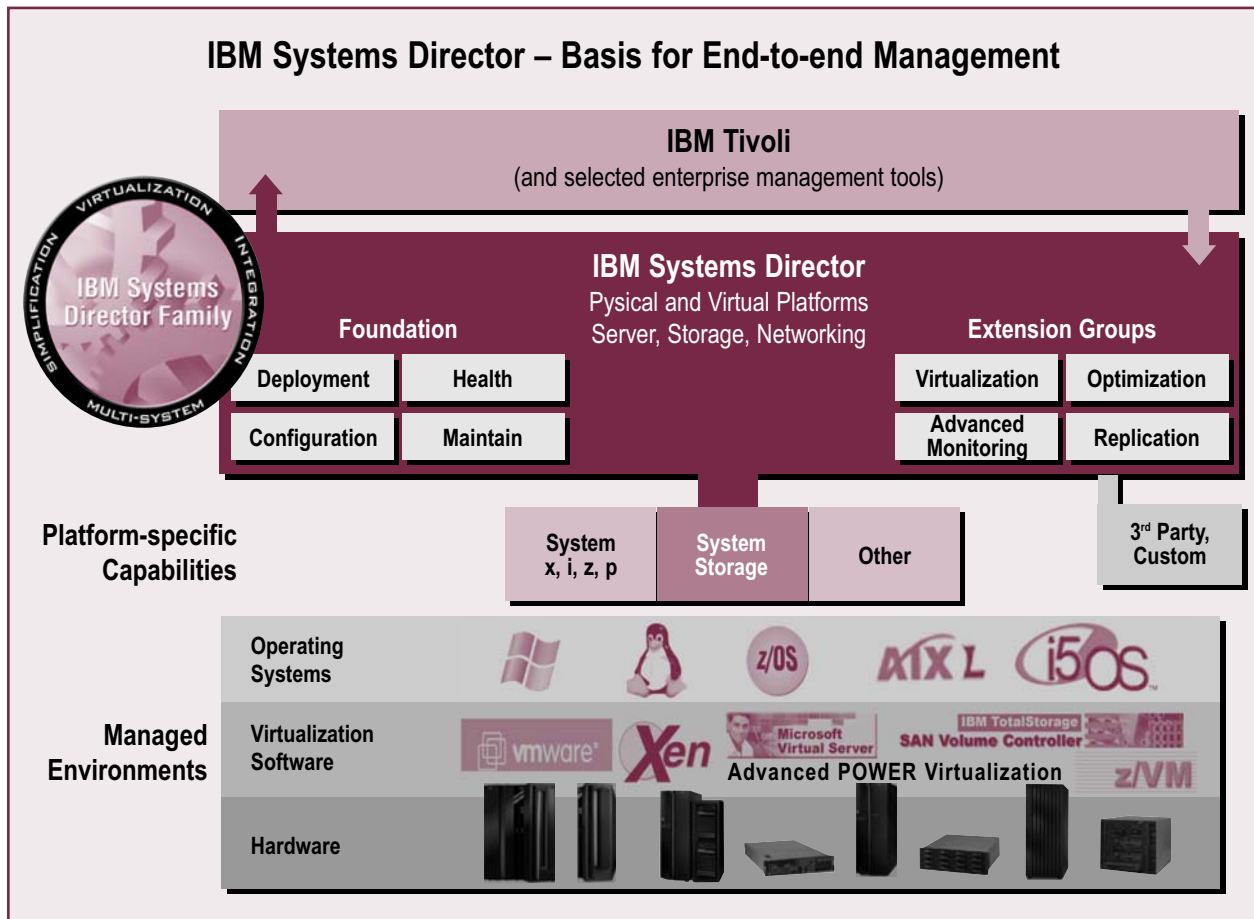


Figure A1: IBM Systems Director – Basis for End-to-end Management

The suite incorporates standard, foundational capabilities to manage system configurations, deployment, maintenance, and ongoing health-checking management processes required in every systems environment. It also offers optional, additional extensions, with more advanced management functionality for virtualization, replication, optimization, and advanced systems monitoring. Specific, in-depth, and full-feature exploitative support for the IBM System z, System p, System i, System x, and BladeCenter server platforms, and for the IBM System Storage systems line are included, together with basic support for major third-party platforms. All the major operating systems offered on the IBM Systems families are also supported.

IBM Systems Director also manages leading virtualization hypervisor platforms, including IBM z/VM (System z), IBM Advanced POWER Virtualization (System p & i), VMware ESX Server (System x & BladeCenter), Xen, Microsoft Virtual Server, and the IBM Storage Area Network (SAN) Volume Controller (IBM System Storage & third party storage systems).

IBM System Director is now also closely integrated with IBM's strategic IBM Tivoli Monitoring family, including the IBM Tivoli Enterprise Portal that provides a single, unified, Graphical User Interface (GUI) for all enterprise event management and monitoring. Generally deployed on Windows workstations/distributed hardware platforms, but also available on System z Linux.

## Our Analysis

IBM Systems Director was substantially further developed and extended from the sound basis of IBM's popular and well-regarded, earlier IBM Director family, originally the system manager for IBM's System x (x86/x64) and BladeCenter platforms. IBM Systems Director can integrate up into the whole, extensive IBM Tivoli enterprise management software suite, including the IBM Tivoli Enterprise Portal's complete enterprise management view. Other enterprise management suites (HP, CA, and BMC) can also be linked similarly. In our assessment, this platform manager has today become a powerful, comprehensive, modern, highly usable and attractive foundation for system management for all IBM Systems server users – including those on System z. IBM Systems Director also brings the modern Windows GUI look, feel and operation to System z platform management, encouraging younger IT professionals who grew up using GUIs to work more comfortably with the mainframe.

# Appendix B: IBM TotalStorage Productivity Center – Storage Management Foundation 2008

## IBM TotalStorage Productivity Center Suite

Crucially important to efficiently operating today's increasingly complex and heterogeneous physical/virtual enterprise storage environments are vendor-supplied, foundation storage management software tools. IBM System Storage today offers an extended, modular, comprehensive and unified storage management foundation tool, its well-regarded "IBM TotalStorage Productivity Center (ITPC)" suite.

The ITPC suite of storage infrastructure management tools helps customers reduce the complexity of managing their storage environments by centralizing, simplifying, and automating storage tasks associated with storage systems, storage networks, replication services, and storage capacity management.

For 2008, the ITPC suite offering now comprises:

- **IBM System Storage Productivity Center.** (Inclusive with IBM DS disk storage, see Figure B1.)
- **Basic Edition.** (Base ITPC edition, see Figure B1.)
- **IBM TotalStorage Productivity Center for Data.** (Optional component, see Figure B2.)
- **IBM TotalStorage Productivity Center for Disk.** (Optional component, see Figure B2.)
- **IBM TotalStorage Productivity Center for Fabric.** (Optional component, see Figure B2.)
- **IBM TotalStorage Productivity Center for Replication.** (Optional component of Enterprise Storage Server (ESS) only, see Figure B2.)
- **IBM TotalStorage Productivity Center Standard Edition.** (Comprehensive, full-function ITPC edition, see Figure B1.)

The three core ITPC product/packages offered are shown, and their capabilities are briefly characterized, in Figure B1.

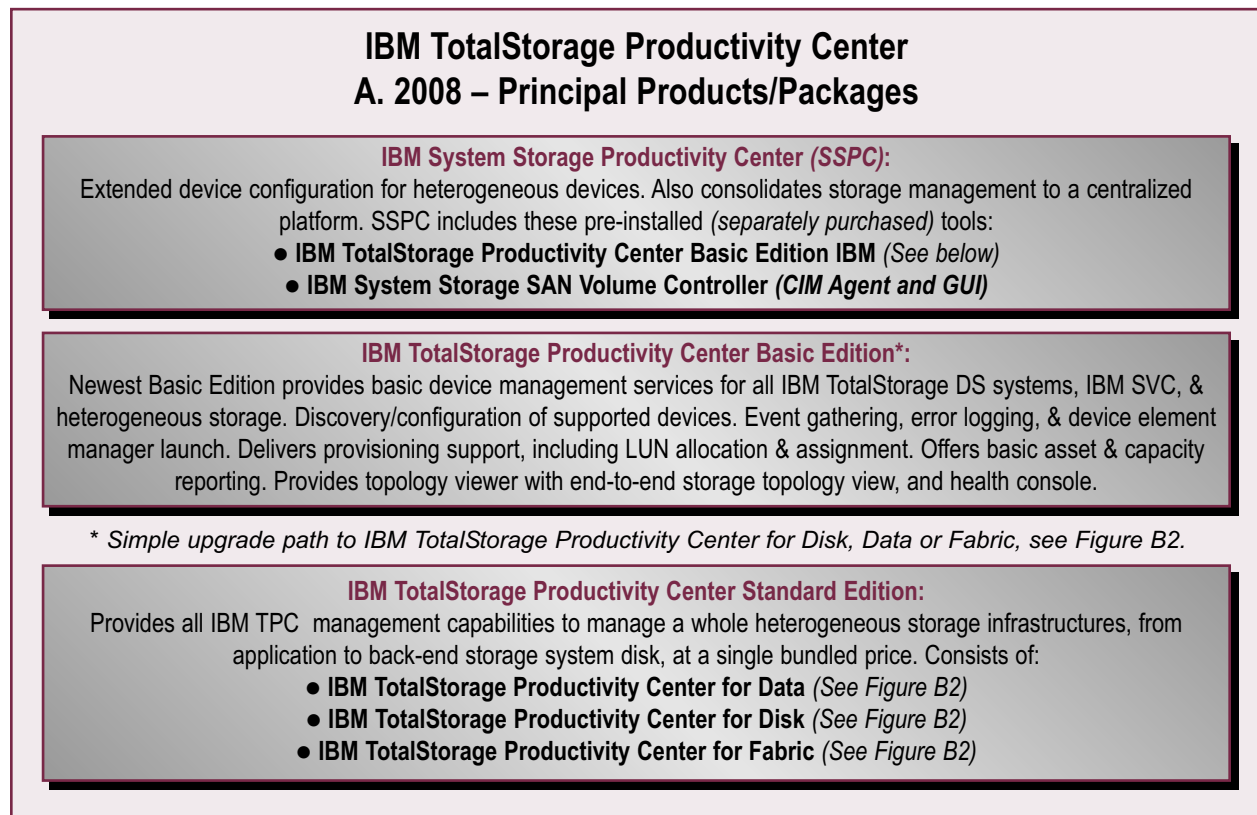


Figure B1: IBM TotalStorage Productivity Center in 2008 – A. Principal Products/Packages

In addition, four optional, additional ITPC products are offered, and these are shown, and their capabilities briefly characterized, in Figure B2.

## IBM TotalStorage Productivity Center B. 2008 – Additional Functional Options

**IBM TotalStorage Productivity Center for Data:**

Comprehensive capacity management for file systems & application databases. Manages storage utilization from file & application perspectives, improving efficiency & availability. Uncovers duplicate, obsolete, stale & orphaned files. Features comprehensive enterprise-wide reporting, monitoring & alerts, plus automated capacity provisioning for file systems.

**IBM TotalStorage Productivity Center for Disk:**

Comprehensive device management reduces cost/complexity by consolidating admin./configuration of storage devices. Also provides replication & performance monitoring & management - over multiple IBM storage subsystems & SMI-S compliant devices (*all managed & configured from the one console*), improving availability. It also offers performance monitoring & threshold alerts of devices, as well as providing performance advice on best LUN recommendations.

**IBM TotalStorage Productivity Center for Fabric:**

Comprehensive management solution for multi-vendor SANs, simplifies SAN fabric management, & improves availability. Offers enterprise-scalable, ANSI SAN standards-architected support for "best-of-breed" storage products. Features automatic device discovery & topology rendering, zone control, SAN component, real time monitoring & alerts. Also offers SAN error prediction capabilities.

**IBM TotalStorage Productivity Center for Replication:**

Replication manager providing copy services management for the IBM TotalStorage ESS array. Provide configuration & management of the ESS FlashCopy, & ESS Synchronous PPRC, capabilities.

**Figure B2: IBM TotalStorage Productivity Center in 2008 – B. Additional Functional Options**

## Our Analysis

The "ITPC" naming harks back to the previous IBM storage branding (*TotalStorage*) generation (*now known as IBM Systems Storage*), and therefore may be renamed at some stage. The suite offers comprehensive modern, Graphical User Interface (GUI)-based, storage management, for IBM and non-IBM storage systems, file systems and applications databases, Storage Area Network (SAN) fabrics, and ESS replication services, managing both physical and virtual storage (*with IBM SAN Volume Controller (SVC), etc.*). Generally deployed on Windows workstations/distributed hardware platforms, but also available on System z Linux. The platform is well regarded and widely used by most IBM System Storage customers. ITPC also easily integrates upwards into the extensive IBM Tivoli value-added storage management range, including for System z mainframe storage environments. The product also integrates naturally with the IBM Systems Director server-centric management suite described in Appendix A, both sharing powerful, modern, open and extensible Eclipse platform underpinnings. With IBM System Storage holding the worldwide number-one market share position in total external disk, tape, and in total storage revenues, for 2007, the ITPC suite plays an equally important part as a storage-management-underpinning foundation.

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*The platform is well regarded and widely used by most IBM System Storage customers.*

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# Appendix C: IBM Tivoli Service Management Center for System z (SMCz) – Products Assessed – August 2008

## Introduction

Section 6 introduced the IBM Tivoli SMCz solutions that equip the System z mainframe to take on the enterprise-wide service management hub role; an important extension of the giant's IBM Service Management (ISM) strategy (see *Section 5*). We showed the three architectural layers of SMCz (in *Figure 14 on page 39*), and reviewed each of the six functional software domains now supported by SMCz. We named and briefly introduced most of the IBM Tivoli products supporting SMCz in each of these six domains in *Section 7 (and listed these compactly in Figure 17 on page 50)*.

This Appendix C provides deeper reviews/assessments of a selected subset of that extensive IBM Tivoli SMCz-related portfolio. We cover only newer, some significantly enhanced, and/or those products we feel play a central part in the SMCz architecture. Other excellent, important, often well-established, and widely-known IBM Tivoli products are thus not profiled here.

## 1. SMCz IT Process Management Solution Profiles

This process management solutions domain includes SMCz's highest level, greatest added value, new Information Technology Infrastructure Library (ITIL) best-practices-based process managers, each addressing an important area of IT operations. These were introduced, and briefly described, in *Section 7 subsection 1, from page 41 onwards*. IBM has developed five ISM process managers to date; two now available on System z Linux as part of SMCz. These advanced process managers embed proven best practices workflows, tightly integrating appropriate IBM Tivoli operational management tools and the core IBM Tivoli Service Management Platform (ITSMP) (see *domain 2 below*) products, to enable substantial automation and improved service management of those important IT operational areas. This domain also includes important IBM service management knowledge base tools, and the IBM Open Process Automation Library (OPAL) catalog of integration modules that greatly extend the IBM Tivoli portfolio's standard integration offerings. The latter are high-value added elements that can greatly assist customer SMCz deployments.

### IBM Tivoli Service Request Manager (ITSRM) V7.1

See profile under domain 2 below. Noted here because it can be viewed as a powerful process manager for service requests of all types.

### IBM Tivoli Release Process Manager (ITRPM) for System z Linux V7.1.1

ITRPM is one of the ISM process managers; an advanced productivity tool solution addressing the Release Management domain as defined by ITIL. The tool automates complex deployments under the enterprise's overall release management process, allowing release impact on IT infrastructure and business-critical functions to be assessed before deployment. ITRPM enables efficient management of releases of new or upgraded software, and related hardware, for server provisioning and patch deployment. It delivers everything that IT operations need to plan, schedule and deploy releases, for any combination of software, hardware, firmware or document configuration items. The tool ensures release tasks are completed in proper order and by appropriate IT resources. ITRPM offers time-saving, of-the-box features like centralized reporting, workflows that can be customized, and templates that speed release process development, and also delivers out-of-the-box reports on Key Performance Indicators (KPIs) for better business alignment of releases. Its portal-based reporting tool provides real-time view of release status and pending tasks, aiding efficient management of release operations.

ITRPM is tightly integrated with the IBM Tivoli Change and Configuration Management Database (ITCCMDB), and thus offers consistent release tracking over the lifecycle, from planning to production, with the one tool. ITRPM also integrates with operational management products, including the IBM Tivoli Configuration Manager (*that automates patch and application deployments*) and with IBM Tivoli Provisioning Manager (*that automates complex deployments across multiple servers*). (*Offered on System z Linux and distributed platforms.*)

**Analyst Comment:** This automated, integrated release process manager tool minimizes risks, protects production and test IT environments, gives much better release control, and better preserves Service Level Agreements (SLAs), making the deployment of releases a quality, repeatable, ITIL-based process. It also helps ensure release schedules are met based on business priorities, that the proper specialist resources are assigned when needed, and that the release workflows drive timely communication throughout. Much higher visibility, transparency, clearer release responsibilities and authorities, faster release cycles, less downtime and service impact, better traceability, lower release costs, and higher productivity on all release efforts are amongst the powerful release management benefits that ITRPM delivers.

Three other process managers, the IBM Tivoli Capacity Process Manager (*ITCPM*), the IBM Tivoli Availability Process Manager (*ITAPM*), and the IBM Tivoli Storage Process Manager (*ITSPM*) are also currently available on distributed platforms. It remains unclear whether IBM will offer System z (*Linux*) versions of these *ITCPM* and *ITSPM* process managers for use under *SMCz* in future. We think it highly likely a System z Linux-based version of *ITSPM*, fully enabled for System z storage management processes, will be introduced, at the least, to meet an obvious need for enterprise-wide storage management process automation of mainframe and open system storage from a single hub.

### **IBM Tivoli Business Continuity Process Manager (*ITBCPM*) for System z Linux V7.1**

*ITBCPM* delivers a comprehensive Business Continuity (*BC*) solution, by providing ITIL-aligned best-practice configurable processes to plan, test and execute IT service continuity. It helps fully integrates the management of people and processes with the underlying continuity technology solutions. *ITBCPM* is a powerful ISM process manager specifically developed to fully integrate with, exploit and support the System z environment under *SMCz*. The System z platform, of course, itself offers the industry's most extensive and refined Disaster Recovery/Business Continuity (*DR/BC*) capabilities. The tool supports the planning and documenting of recovery strategies and activities, can simulate outage events to test and verify recovery procedures, and can automatically notify the required people according to roles when an outage occurs. The tool also supports the analysis of outage situations with their impacts, and supports the selection, agreement upon, and approval of, the most appropriate recovery plan, which it then executes. It also provides invaluable *BC*-specific reporting and dashboard displays against the business KPIs.

On System z, *ITBCPM* exploits detailed z/OS infrastructure information discovered by DLAs for z/OS Sysplexes, z/OS Logical Partitions (*LPARs*), Geographically Dispersed Parallel Sysplex (*GDPS*) solutions, and from IBM Tivoli Systems Automation (*ITSA*) for z/OS. The tool takes full advantage of the core *SMCz* for System z Linux infrastructure of the *ITCCMDB* and IBM Tivoli Application Dependency Discovery Manager (*ITADDM*) products (*both assessed in subsection 2 below*), also integrating with other IBM Tivoli operational management products. General Availability (*GA*) with *SMCz* May 20<sup>th</sup> 2008.

**Analyst Comment:** *ITBCPM* for System z Linux V7.1 is a powerful *BC* process manager optimized to leverage *SMCz* automated service management, exploiting and extending the System z platform's unrivalled native *DR/BC* capabilities wider across the enterprise. It provides automated process flows for *DR/BC* aligned to industry best practices/ITIL standards. Deployment of *ITBCPM* cuts risks of human error in system/applications recovery efforts and aligns staff work efforts closely with prioritized recovery tasks. By providing more efficient, effective, and fully tested recovery plans for important business systems and applications, it reduces outages and their business effects, raises operations productivity, and speeds recovery by automating execution tasks. *ITBCPM* therefore also minimizes the risks of *SLA* violations and their associated costs, and helps integrate *BC* management with other key IT processes. Finally, the process manager helps ensure comprehensive *BC* testing, including not only the technology, but also the (*often-overlooked*) people and process aspects.

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*ITBCPM for System z Linux V7.1 is a powerful BC process manager optimized to leverage SMCz automated service management...*

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### **IBM Tivoli System Automation Application Manager (*ITSAAM*) (for z/OS & zLinux) V3.1**

Launched at IBM Tivoli Pulse 2008, *ITSAAM* helps enterprises to coordinate and manage across heterogeneous cluster technologies, in order to enable better control of enterprise business services, from one, powerful, single point of control. Leveraging its single point of control capabilities, this new product manages high-availability operations and cross-cluster resource dependencies, across any combination of System z, Linux, AIX, Windows and Solaris platforms, to help better control enterprise business services. It speeds up problem resolution in complex clustered environments by using a Web-based interface to access clear views of applications and their relationship to other applications, servers and systems, and to then drill down to determine the impact of failures.

*ITSAAM* can mitigate the impact of service disruptions by providing centralized control for all distributed clusters, and System z Sysplex environments, to help make time-critical decisions that prevent unplanned outages and to better prepare for planned outages, such as routine maintenance. *ITSAAM* also offers an additional *DR* component for System z mainframes using the *GDPS* cluster solution that works by notifying *GDPS* to trigger *DR* actions when needed.

**Analyst Comment:** Adopting *ITSAAM* increases operations staff productivity by consolidating to a single operations and automation team employing this one tool to manage heterogeneous clusters, without needing detailed knowledge of either the applications or their associated cluster platforms. Enterprises may install the *ITSAAM* server on the highly-available z/OS operating system, and can also leverage investments in IBM Tivoli System Automation (*ITSA*) for z/OS to manage critical business systems on the platform as the trusted point of control for high-availability and *DR* functions.

**IBM Tivoli Availability Process Manager (*ITAPM*)** – Currently distributed platforms only.

**IBM Tivoli Capacity Process Manager (*ITCPM*)** – Currently distributed platforms only.

**IBM Tivoli Storage Process Manager (*ITSPM*)** – Currently distributed platforms only.

**IBM Tivoli Business Service Manager (ITBSM) V4.1** – See subsection 2 below.

### **IBM Tivoli Unified Process Composer (ITUPC) V7.1.**

ITUPC provides detailed documentation of all types and areas of IT service management processes, based on industry best practices. This content and tooling enables content customization, extension and publishing of the enterprise-specific processes finally deployed. The tool enables IT organizations to define, maintain, and to communicate, the optimal relationships established between people, processes and technologies throughout their IT operations, for greater clarity, clearer responsibilities and authorities, better integration, and increased IT operations efficiency and effectiveness.

ITUPC enables IT groups to quickly document proven best practices that help enhance IT Service Management (ITSM) processes, exploiting the tool's prescriptive, customizable knowledge-base to provide most of the information needed to document uniquely tailored processes, and implement appropriate practices. The knowledge base covers processes, work products, roles, tools, and scenarios. The tool also provides invaluable contextual guidance to help users understand when and how to apply specific IBM Tivoli tools, which facilitates efforts to increase levels of automation, for tasks as well as high-level processes, over the enterprise. The ITUPC knowledge database is based on the IBM Process Reference Model for IT (PRM-IT); a closely ITIL-aligned model jointly developed by consultants from IBM Global Services (IGS), and ISM experts from IBM Tivoli. ITUPC-created processes can be published to Web sites or in Portable Document Format (PDF) documents. The ITUPC tool includes the IBM Rational Method Composer (IRMC), IBM's best-of-breed, Eclipse-based process documentation and customization tool, also used by the IBM Rational Unified Process for software development. With IRMC, users can customize the eXtensible Markup Language (XML)-based method library and publish the content. Both forms-based and graphical editing may be used. (*Windows workstation-based tool/editor product, platform-independent.*)

**Analyst Comment:** ITUPC provides a fast start, extensive content and embedded knowledge, and an invaluable learning resource, for the IT operations staff implementing SMCz and ISM. It enables the development, documentation, publication, and sharing of information on the enterprise-specific IT operations processes, based on ITIL and IBM best practices that have been adopted, and which are the basis for further automation. It therefore accelerates delivery of more effective and efficient IT services management solutions to support business objectives.

### **IBM Tivoli Unified Process (ITUP) V7.1.1.**

Free-of-charge, downloadable, read-only, IBM knowledge-based and best practices-sharing offering, providing guidance and insight into widely-accepted IT best practices frameworks, including ITIL V3, CoBIT, PRM-IT and enhanced Telecom Operations Map (eTOM). ITUP's knowledge base also packages, and makes easily available, the wealth of years of accumulated practical experience from IBM's thousands of service and operational systems management engagements, and from IBM Tivoli experts. The latest ITUP V7.1.1 release provides extended support on IT governance, and offers detailed ITIL V3 processes/practices mapping to the ITUP processes. It also provides valuable mapping from the ITIL V3 processes to available IBM Tivoli tools, highlighting how and where the tools support each process. The knowledge base is organized around the IBM PRM-IT process reference model that covers all 41 processes under the control of Chief Information Officers (CIOs). ITUP is an integral component of ISM and SMCz, although it is platform-agnostic. (*Workstation content/knowledge dissemination product.*)

**Analyst Comment:** ITUP provides an invaluable guide and knowledge source for IT operations teams implementing Enterprise Service Management (ESM), especially those adopting with ISM and/or SMCz. It offers detailed process diagrams and descriptions that give clear explanations of all main IT processes, the relationships between these processes, and the roles and tools involved in an efficient process implementation.

### **IBM OPAL**

Another powerful, valuable ISM knowledge-sharing offering is the IBM OPAL library that today provides an extensive online catalog of solution integration modules that ISM adopters can download and plug into their environments, to extend functionality and meet new needs. OPAL now provides a rich collection of proven integrations and workflows between IBM Tivoli products that address many service management needs not covered by standard product integration capabilities. The Web-based OPAL public library now offers over 900 such integration modules. Originally started as a catalog of integrations for IBM Tivoli Provisioning Manager, OPAL today offers a far broader, more comprehensive, integration module solutions catalog, covering many products in the IBM Tivoli SMCz family, as well as some popular third-party enterprise products.

OPAL integration modules come from IBM Tivoli's own developments, and from Independent Software Vendors (ISVs). Every OPAL ISV integrated solution meets IBM technical validation specifications, and carries the "Ready for IBM Tivoli software" validation mark. OPAL catalog entries provide the integration information needed to "choreograph" standard products to meet additional business challenges. ISVs actively participate in adding new OPAL catalog integration solutions entries because these strongly promote that ISVs products, services, and skills to a wide enterprise IT user base. The OPAL Web Graphical User Interface (GUI) has been also significantly improved, to facilitate effective search and location of solutions.



OPAL catalog entries now address a very broad range of IBM Tivoli tools, over a wide spectrum of business contexts, and offer diverse forms of integration solutions. The latter include: adapters; probes; agents; connectors; parsers; automation policies; workflows; discovery library adapters; software package definitions; technical integration papers; and technical tips, etc. Current OPAL coverage, for three example areas, includes:

- **Storage & Security Management:** 100+ integration modules – for IBM Tivoli Identity Manager and the IBM Storage Manager product families.
- **Enterprise Asset Management:** 37+ integration modules – for the IBM Maximo Asset Management (*IMAM*) family.
- **Software Provisioning & Orchestration:** 274+ integration modules – IBM Tivoli Provisioning Manager family, IBM Tivoli Configuration Manager, ITSA/IBM Tivoli System Automation, ITCCMDB etc.

**Analyst Comment:** OPAL has now grown and expanded to become an invaluable source that service/systems management professionals can rely upon to quickly find, obtain, and deploy, proven IBM Tivoli portfolio-based, new integration modules and solutions that can short-cut solving their service management needs and challenges. These add tremendous value to enterprises seeking to deploy cohesive ISM solutions, and to fully exploit their IBM Tivoli products, delivering enhanced functionality and features, more power, and greater interoperability from their products, whilst saving time and effort.

## 2. SMCz ITSM and Process Automation Solution Profiles

This domain encompasses the core products comprising the ITSMP at the heart of SMCz (*and ISM*) service management deployment. The business service management aspects revolve around the integration between the ITBSM and the ITADDM. Together, these provide end-to-end discovery of applications and processes, and offer availability management with real-time dashboard status displays to control when an application is added, becomes unavailable, or is violating a SLA, for highest visibility. This domain was introduced, and its functions and supporting products briefly described, in Section 7, subsection 2, from page 44 onwards.

The ITSMP also integrates industry-standard ITIL-based process automation best practices, and the above components, with the other core ISM foundations, the ITCCMDB, the ITSRM, and the IBM Tivoli Enterprise Portal. The close integration between these ITSMP products eliminates “silos” of applications, and delivers a combined view into business applications and the overall data center. SMCz brings these integrated (*server*) products onto the System z Linux platform environment for the first time, now enabling the System z mainframe to serve as the enterprise’s business services management hub.

### IBM Tivoli Service Request Manager (*ITSRM*) V7.1

Important, powerful, feature-rich, flexible and configurable enterprise service desk and asset management product, central to the ITSMP that powers SMCz, and fully integrated with other core components, and with numerous IBM Tivoli operational management products (*via adapters*). ITSRM manages all end-user IT service requests, with extensive enterprise service desk and service catalog capabilities, combined with service support and asset management processes. The ITSMP service desk functions offer streamlined, day-to-day management of incidents and problems, and its service catalog enables users to shop for and obtain IT services from published service offerings.

ITSRM increases service desk efficiency, effectiveness, and productivity, reduces disruptions, streamlines the service desk operation, improves customer satisfaction, and reduces costs. It ensures consistent, repeatable, standardized service fulfillment, helping to ensure SLA compliance. The product is therefore a core software foundation for ISM implementation. Its incident and problem management functions give priority to resolving the end-user’s problem over root-cause analysis, to provide higher service levels and greater support for higher employee productivity. The tool also offers end-user self-service, giving an easy-to-access, browser-based User Interface (*UI*), enabling end users to submit tickets, view updates, and search solutions directly online with the service desk. An in-built e-mail listener efficiently processes inbound e-mails into service requests. The standard provided ticket templates save time by pre-populating work order fields with much of the information needed for a new service request.

A searchable solutions knowledge base provides quick access to known solutions for specific service requests, and this internal knowledge base can be easily extended as new issues/solutions are found. Built-in configuration tools are provided that allow users to quickly and easily change their workspace, user interface, workflows, and reports, to suit their unique requirements. ITSRM is based on open standards-based technology, and is a full Web-architected platform built in Java Enterprise Edition™ (*Java EE™*) with advanced Business Process Management (*BPM*), based on Service Oriented Architecture (*SOA*), Web services and XML. The product supports extensive integrations with other ITSMP, IMAM, and IBM Tivoli operational management products via provided adapters. ITSMP also provides the process engine and enterprise services catalog functions for the whole ITSMP, the former used by all the process managers in domain 1 above to execute their designated workflows. Finally, to help with the business management of services, ITSRM allows the IT department to associate costs with the service offerings provided, and to manage their consumption. (*IBM Maximo N-tier solution. Window client workstation, Windows development workstation, distributed platforms application server.*) GA May 16<sup>th</sup> 2008.

**Analyst Comment:** ITSMP helps enterprises to raise their service availability, speed mean-time-to-repair, improve infrastructure availability and stability, reduce disruptions, and reduce service costs. It also delivers increased business end-user satisfaction, by delivering common global service and asset management support levels enterprise-wide. Overall, ITSRM can therefore help enterprises to better align their IT operations, their service level management, their service provisioning, and their service catalog.

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*We expect IBM will now provide formidable competition to established service desk software ISVs with this top-class, full-function, latest technology offering.*

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With its comprehensive ISM strategy and this modern, competitive, full-function ITSRM service desk management offering, IBM has entered into head-to-head competition with specialist service desk ISVs. This is now a class-leadership offering also fully integrated within IBM's broad, compelling, ISM-supportive SMCz portfolio. Built upon the advanced, modern IBM Maximo platform from its MRO Software acquisition, ITSRM is a most competitive, fully featured,

enterprise service desk solution. We expect IBM will now provide formidable competition to established service desk software ISVs with this top-class, full-function, latest technology offering.

### **Tivoli Application Dependency Discovery Manager (ITADDM) for System z Linux V7.1**

Powerful enterprise application service and infrastructure auto-discovery solution, providing automated application dependency mapping and configuration auditing, that is an essential ISM underpinning, and a central ITSMP component. ITADDM delivers comprehensive visibility into business applications running on major platforms by automatically creating and maintaining complete and detailed business application maps, with their supporting infrastructures. These include complete runtime dependencies, deep configuration values, and complete change histories. Its user-friendly GUI, with rich customization options, provides this deep configuration detail, and easily consumable graphical representations (*dependency maps*) of complex IT infrastructures.

The tool audits configurations by tracking application changes, depicting that information on application maps and reports, and by bringing complete visibility to configuration drift. ITADDM also includes the open, federated ITCCMDB to automate process execution, simplify architectural complexity, and help reduce incident and problem management costs. (*See below.*)

Agent-free discovery creates and visualizes the real application topology quickly, without the costs of agent deployment/management throughout the environment. The tool exploits the Common Information Model (*CIM*), which is extensible and standards-based, and includes "out-of-the-box" discovery of several hundred different infrastructure components commonly found within data centers, from the application software, host, storage, and network tiers. It also provides in-depth visibility into the infrastructure configurations that underpin and manage applications, and helps effectively implement critical changes that affect service delivery. The product was built for easy integration, with an open architecture, robust/open Application Programming Interfaces (*APIs*), and a complete and simple-to-use Software Development Kit (*SDK*). ITADDM also uses industry-standard secure protocols during its discovery process, thus making certain that sensitive data is both secured and that only authorized access is permitted. This hugely powerful, impressive, and advanced, product/technology came into IBM Tivoli through the invaluable 2004 Collation acquisition, and has since been significantly enhanced, extended, and integrated into the ITSMP portfolio. GA in SMCz May 20<sup>th</sup> 2008.

**Analyst Comment:** ITADDM was a hugely important, powerful addition to the IBM Tivoli portfolio, and is one of the enabling foundations of the ITSMP and ISM. Now also implemented on System z Linux, ITADDM is therefore now also a cornerstone of SMCz. It provides powerful discovery support for cost-effective, successful customer SMCz implementations. It reduces the business risks of service failures and inconsistency, as well as helping ensure compliance to company technology and regulatory standards. It also greatly minimizes the time needed for problem root-cause analysis, and can often reduce the time to problem resolution by up to 90%, or even more.

### **IBM Tivoli Change and Configuration Management Database (ITCCMDB) for System z Linux V7.1.1**

The other central foundation for ISM and SMCz, the ITCCMDB, is an enterprise-ready database platform for storing deep, standardized enterprise IT configurations and change histories, in order to better integrate people, processes, information and technology data. ITCCMDB provides the common repository for all Configuration Items (*CIs*) representing IT resources. Its wide range of DLAs can automatically discover most types of configuration data and store it in the ITCCMDB. It features a non-intrusive, agent-free, discovery approach, provides fast and automated application discovery, tracks deep configuration details, supports enterprise-class security, and supports easy integration with many other data sources. Discovery scope includes a wide variety of computer systems, network devices, applications, middleware, and databases.

ITCCMDB offers a convenient portal interface, through which users can create, assign, monitor, notify, act upon and report on change requests and configuration items using a best practice ITIL process. The extensive integration capabilities enables existing operational management products (*from IBM Tivoli and other vendors*) to be integrated with the ITCCMDB, providing a consolidated view of the infrastructure whilst preserving existing tool investments. The product also includes a toolkit that allows users to create custom DLAs and integration modules specific to their environment needs. Advanced capabilities, and their benefits, include:

- **Automated application mapping:** Agent-free discovery of configuration items, and transactional relationships, helps identify/manage resources in the context of the services they support.
- **Best Practices change management process:** Out-of-the-box best practices value, built on years of expertise, gives faster time-to-return, and lowers change implementation risks.
- **Integrated configuration management:** Enables an organization to manage desired states of configuration item, application, and service configurations, which helps validate compliance with internal and external policies.
- **Process integration platform:** The ITCCMDB allows additional ITSM processes to be easily integrated, supporting higher organizational automation and productivity.

ITCCMDB DLAs for z/OS captures configuration details and dependencies for that flagship System z mainframe environment. ITCCMDB thus provides a scalable change and configuration management platform for the implementation of successful ISM initiatives that simplifies architectural complexity and reduces incident and problem management costs. The SMCz-aligned System z Linux implementation of ITCCMDB went GA May 20<sup>th</sup> 2008.

**Analyst Comment:** IBM's ITCCMDB was a core ISM and ITSMP foundation, and a hugely important advance that helped user organizations assess change impacts, reducing business/service risks. Now available for System z Linux, it provides a core foundation for the SMCz role, and for all the process managers reviewed in Appendix C, domain 1 above. It also helps to ensure compliance (*internal and regulatory*) by tracking all changes and by enforcing change policies enterprise-wide. The ITCCMDB simplifies architectural complexity and reduces incident and problem management costs. By integrating, automating and optimizing data, workflows and policies, the ITCCMDB helps users better align IT infrastructure management with business priorities. ITCCMDB is thus the common IBM Tivoli repository for all configuration items representing IT resources. The range of DLAs provided can discover most types of configuration data and store it in the ITCCMDB. GA in SMCz was May 20<sup>th</sup> 2008.

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*The ITCCMDB simplifies architectural complexity and reduces incident and problem management costs.*

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### **IBM Tivoli Enterprise Portal (ITEP) V6.2**

ITEP is a graphically-rich, comprehensive, single-portal, UI for managing all services, systems, and IT assets across the whole enterprise IT infrastructure. It also provides a single, unified, enterprise-wide interface for all the IBM Tivoli monitoring products (*with which ITEP is pre-integrated*) across all enterprise platforms, delivering flexible windows into the entire monitored network and applications for clear visibility at both overview perspective levels, or at in-depth level in specific areas. It provides a browser-like, high-level, tree-structured view of the enterprise network environment for navigation, displaying alert icons where problems are occurring, and also displaying fuller details of the selected item in another panel.

Numerous IBM Tivoli portfolio members now use the ITEP to display their real-time information to enable users to better manage all their day-to-day IT functions. IBM Tivoli System z solutions built to now integrate with, and fully exploit this powerful ITEP portal interface now include most of the IBM Tivoli monitoring products, plus now leading IBM Tivoli automation, scheduling, and business services management tools:

- **IBM Tivoli OMEGAMON XE on z/OS V4.1.0.**
- **IBM Tivoli OMEGAMON XE for CICS on z/OS V4.1.0.**
- **IBM Tivoli OMEGAMON XE for IMS on z/OS V4.1.0.**
- **IBM Tivoli System Automation for z/OS V3.2**
- **IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS V1.1.0.**
- **IBM Tivoli Business Service Manager V4.1 (See below).**
- **IBM Tivoli NetView V5.3.**
- **IBM Tivoli Monitoring V6.2.**
- **IBM Tivoli System Automation for z/OS V3.2.**
- **IBM Tivoli Workload Scheduler for z/OS V8.4, etc.**
- **IBM Tivoli OMEGAMON XE for Mainframe Networks on z/OS V4.1.0.**

Base technology for ITEP came into the IBM Tivoli portfolio with IBM's seminal 2004 acquisition of Candle Corporation, whose OMEGAMON System z tools were, and remain today, far that segment's most popular and widely-used mainframe Performance Analysis/Performance Monitoring (PA/PM) tools, and whose CandleNet portal offering provided the basis for ITEP. (*The ITEP Portal Server today runs on distributed platforms – UNIX, Linux & Windows on x86/x64.*)

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*...ITEP is the industry's most comprehensive, integrated, end-to-end infrastructure management integration and visualization solution available...*

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**Analyst Comments:** IBM fairly claims that ITEP is the industry's most comprehensive, integrated, end-to-end infrastructure management integration and visualization solution available, a view we affirm. It provides a superior, more productive, more efficient, and less-costly way to manage users' growing, and more complex mainframe environment.

Additionally, it also now integrates and unifies multi-platform, distributed systems management information from across the enterprise infrastructure into the same, cohesive, unified and productive management portal view, delivered under the SMCz role's objective of managing the entire infrastructure better from a System z hub.

#### **IBM Tivoli Business Service Manager (ITBSM) V4.1**

ITBSM delivers real-time enterprise business service visibility and intelligence to maximize and effectively manage the business service's operating performance and health in real-time. It supports Line-Of-Business (LOB), as well as the IT operations executives, managers and staff, helping provide common alignment and shared understanding between the two sides. ITBSM achieves this by visually displaying and tracking, through targeted business and IT operational dashboards and service scorecards, how the business is actually delivering against real business KPIs, and also showing how business services are performing against their SLAs. ITBSM also helps to ensure the continuous health of all services, processes, transactions, missions, and business activity, by speeding problem resolution with automated service impact and root cause analysis. ITBSM also helps to automate service model maintenance via its dynamic, federated information model, which collects event and other data from the widest range of sources. It takes full advantage of, but adds new value to, all existing IBM Tivoli and third-party tools. Key ITBSM features and advantages are:

- **Role-based Views:** Flexible, customizable visualization adaptable to all services and processes, and to suit all end-user roles/perspectives, including executive, LOB manager, operations staff, and customers.
- **Balanced Scorecards:** Exploits business-wide event/service data to build "balanced scorecards" of service health, business and operational performance KPIs. Automatically updates scorecards in real-time to keep them balanced.
- **Real-time KPIs:** Calculates real-time business and operational KPI metrics for scorecards, to aid more effective decision-making. Based on IT event, business, and operational data, collected from virtually any source.
- **Service Impact Analysis:** Quickly pinpoints problem impact on service availability, performance, integrity, and business volume, automatically determining service status. Understands business model's service dependencies/behavior for this.
- **Real-time Event Access:** Collects event transactional information from virtually any/every event sources, the widest range of IBM and third-party monitoring/event tools.
- **Root Cause Analysis:** Brings faster cross-domain problem resolution, by automatically identifying specific causes of service problems over operational silos and dependencies.
- **Dynamic Federated Information Model:** Flexible, standard way of mapping dependency information into a common data model supporting service modeling. Collects real-time dependency information from distributed and host-based data sources.
- **Service Component Repository:** Service objects catalog maps external discovery/relationship data to actual service definition objects, adding an abstraction layer.
- **Real-time SLA Tracking:** Lets administrators define/track SLA compliance in real-time, across transactions, applications, systems, networks, services, and processes, etc.
- **System z Management Added Value:** Provides extensive visibility and intelligence on System z health, extending value of existing IBM z/OS and other IBM Tivoli System z discovery, monitoring, etc., products.

ITBSM V4.1 is currently available for distributed platforms (*UNIXes, Linux & Windows on x86/x64*), reflecting its Micromuse Netcool-derived underpinnings, but DLAs for z/OS and other mainframe integrations provide extensive support for SMCz deployment of this strategic visibility and dashboards platform. It seems likely, although is unconfirmed, that IBM will add a System z Linux ITBSM implementation at some point. However, this would require most of the rest of the extensive Tivoli Netcool stack to be first ported there first, so the timing on this could be lengthy.

**Analyst Comment:** ITBSM V4.1 is such a major advance, and is such a central component of SMCz, providing (*as it does*) the real-time dashboards and score-carding-driven visibility to enterprise-wide service management for SMCz and ISM, we considered the above-extended assessment was well merited. The product provides extensive out-of-the-box integrations to the widest number of data sources, and to the crucial ITCCMDB, but is also tightly integrated with the fully-featured IBM Tivoli Service Level Advisor that further augments its SLA abilities.

This powerful, important, advanced component of SMCz, ISM, and the ITSMP, is based on the sophisticated Netcool/Real Time Active Dashboards technology, plus that of the IBM Tivoli Business Services Manager V3.1 which ITBSM supercedes, extended and integrated by IBM Tivoli. This followed IBM Tivoli's crucial February 2006-closed acquisition of Micromuse Inc. Micromuse was a leading provider of the Netcool network management software brand, widely used by large banks, telecommunications carriers, governments, retailers, and other organizations, to monitor and manage sophisticated technology Internet Protocol (*IP*) network infrastructures.

### **IBM Maximo Asset Management (IMAM) V7.1**

This extensive, sophisticated IBM Maximo enterprise asset management offering delivers a comprehensive view, enhanced management, improved utilization, and better control of all asset types – production, facilities, transportation and IT enterprise-wide. This single, unified, Enterprise Asset Management (*EAM*) common infrastructure, provides a much clearer views of untapped asset capacity/potential, enables far superior asset knowledge, much-improved asset control and optimization, and helps to attain superior alignment of assets behind business goals and priorities. The IBM Maximo Asset Management platform is also the foundation for IBM Maximo vertical industry solutions, and shares its core process automation technology with ISM/SMCz mentioned above, as well as with IBM Tivoli Asset Management for IT, discussed in domain 3 below. This extensive offering includes six essential asset management modules – for asset, work, service, contract, materials and procurement management – that customers use to optimize the performance of every asset. These allow customers to develop comprehensive programs for preventive, predictive, routine and unplanned maintenance for all assets, and help the enterprise to reduce asset costs, increase asset availability, and maximize asset performance and asset lifetime values.

**Analyst Comment:** Full IMAM deployment and exploitation improves enterprise returns on asset investment, decreases asset costs, risks and losses, and increases productivity in asset management. The higher visibility and better asset control it provides helps enterprises to sharply raise their asset decision-making quality, improve their overall business service delivery (*through asset availability*), ensure asset regulatory compliance, and lower asset Total Cost of Ownership (*TCO*) sharply. Further assessment is outside our scope here. (*IBM Maximo N-tier solution. Windows client & development workstations distributed platform applications & reports servers.*)

**IBM Tivoli Service Management Platform (ITSMP)** – Comprises ITSRM, ITADDM, ITCCMDB, & ITBSM together.

## **3.1. SMCz IT Financial Management Solution Profiles**

This SMCz domain's supporting products sharply improve enterprise IT financial management. This domain was introduced, and its functions and products briefly described, in Section 7, subsection 3.1, from page 45 onwards. They help better align IT with business goals, justify IT costs, and improve user/business/IT understanding of the real costs of shared IT resources. This SMCz domain integrates the IBM Tivoli Usage and Accounting Manager with the IBM Tivoli Decision Support for z/OS software, to provide cost allocation and chargeback, based on actual IT resource use. Enterprises can also more effectively manage their IT asset lifecycles for lower cost, reduce their enterprise's license compliance exposure risks, and better manage IT contracts. The IBM Tivoli Asset Management for IT, the IBM Tivoli License Compliance Manager for z/OS, the IBM Tivoli License Compliance Manager, and the IBM Tivoli Contract Compliance Manager respectively support these vital functions. These now-extensive, sophisticated and integrated SMCz IT financial management offerings are relatively new and less familiar, so we cover them all in some depth in this Appendix C. They combine to offer crucial advantages in “**managing the business of IT as a business**”, from the SMCz System z hub.

### **IBM Tivoli Asset Manager for IT (ITAM for IT) for System z Linux V7.1**

This sophisticated, comprehensive, recently-added IT asset management product enables more effective management of IT asset lifecycles, to reduce costs, mitigate license and regulatory compliance risks, and to better align IT with business goals. ITAM for IT provides a single solution for IT asset management that tracks and manages all hardware, software and related information throughout their lifecycles. IT assets the tool can manage include desktops, laptops, servers, mainframes, routers, hubs, Private Branch Exchanges (*PBXs*), switches, mobile devices, software licenses, contracts, maintenance agreements, and many more.

With this tool, IT organizations can optimize IT asset utilization and IT service levels, deploy in compliance with software licenses, and better control the cost of IT assets. This helps to more closely align IT with business requirements, by providing accurate, complete IT asset cost and usage information. It also helps enterprises to reduce IT asset costs, by enabling them to re-deploy underutilized assets, and to avoid the frequent software over-licensing case. By centralizing relevant contract, lease, warranty and license data, ITAM for IT minimizes procurement and maintenance expenses and provides helpful contract renewals negotiation support. The product also helps to improve service desk quality and incident resolution times, by providing accurate IT asset information. As well as this, the tool can help users reconcile deployed asset configurations on the enterprise network, and in the field, against authorized asset configurations.

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*ITAM for IT is an impressive, complete, modern, and fully-featured part of the technically advanced IMAM product suite...*

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**Analyst Comment:** ITAM for IT is an impressive, complete, modern, and fully-featured part of the technically advanced IMAM product suite, built upon IBM's leadership, comprehensive, EAM platform (for IT and non-IT assets). The product is also closely integrated with the ITSRM service desk application reviewed above (also built upon the common IBM

Maximo platform) and supports ITIL best practices. It also integrates with the IBM Tivoli License Compliance Manager (for software license data), with the IBM Tivoli Provisioning Manager (for provisioning data exchange), and with the IBM Tivoli Usage and Accounting Manager (for IT asset usage accounting and cost recharging).

### **IBM Tivoli Usage and Accounting Manager (ITUAM) for z/OS Option V7.1**

The ITUAM Option for z/OS measures, analyzes, reports, and bills, based on actual IT resource usage and costs of shared computing resources. It analyzes reports, and bills for, virtual server, storage, network, software, middleware and e-mail "consumption" by company, department, or individual user. It supports billing of that usage to either external outsourcing clients or to individual departments inside a company, providing improved cost management, fairer recharging, and enabling the IT department to operate as a business. It enables mainframe IT departments and IT service providers to account for, and to chargeback, IT resource usage for both mainframe and distributed systems, even in complex, virtualized, and service-oriented environments.

The ITUAM Option for z/OS provides detailed cross-platform reports and invoicing showing who used each resource, and how much they used. ITUAM Option for z/OS uses information from IBM Tivoli Decision Support (ITDS) for z/OS and allocates costs to the appropriate user and/or department. These two products combined support a wide range of z/OS and System z data sources, including z/OS, CICS, Network Printer Manager (NPM), IMS, MQSeries, Resource Measurement Facility (RMF), DB2, zLinux, and WebSphere Application Server for z/OS.

In addition, the ITUAM Option for z/OS collects, analyzes, reports, and bills based on usage and costs of shared, distributed systems, including Windows, UNIX (AIX, HP-UX, and Sun Solaris), Linux (Red Hat and Novell SUSE), i5/OS, and VMware computing resources. The ITUAM Option for z/OS incorporates technology from IBM's January 2006 CIMS Labs acquisition. New in ITUAM Option for z/OS V7.1 are Web-based reports and integration with the IBM Tivoli Enterprise Portal. The former provides flexible, easy-to-use browser reports with instant drill down. These reports help financial managers/analysts to accurately and fairly analyze and allocate costs and IT resources to the correct user entity. Users may be invoiced, based on the most common cost allocation methods, by business unit, division, department, section, user, project or application, to closely link IT costs with the business entity concerned. ITUAM now also includes full support for global customers, including double-byte character languages. The product is now no longer dependent on the use of Windows.

Daily operations to collect IT resource use and cost data, and to analyze it, by the ITUAM Option for z/OS (and ITDS for z/OS) can be automated, to improve the speed/accuracy of cost allocations, and to further reduce manual efforts. This product combination improves IT Financial Management far beyond basic usage reporting, accounting and billing capabilities. They also analyze utilization across all the main hardware, operating system, applications, and other technology resources, to present computing usage trend data for capacity planning, and often to identify consolidation opportunities across mainframe and distributed infrastructure. The product is essential for outsourcing computing service providers, and/or service bureau operators, who need to accurately measure usage and recharge each of their different customers. No IT platform has suffered more with false cost portrayals, persistently wrong cost myths, and unfair internal cost allocations than the IBM mainframe. ITUAM for z/OS can now accurately and quickly validate the current reality, that a well-run, loaded System z mainframe is now often the lowest-cost platform in TCO per workload unit. ITUAM for z/OS Option V7.1 became available on May 10<sup>th</sup> 2007. This product is also available on System z Linux.

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*ITUAM for z/OS fits all these requirements well, and has therefore been widely welcomed by customers and analysts...*

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**Analyst Comment:** Many diverse workloads run on today's fully virtualized mainframes, alongside rapidly growing portfolios of more granular, SOA-based, composite applications that span mainframe, and often distributed platforms too. A new generation of modern IT usage accounting and chargeback software, optimized for such complex environments was long overdue, and was much needed by thousands of enterprises. Ancient mainframe chargeback solutions, designed decades ago for a physical systems age, cannot begin to cope any longer. ITUAM for z/OS fits all these requirements well, and has therefore been widely welcomed by customers and analysts since IBM first introduced the product. It has now been further significantly enhanced, and better packaged, in this latest V7.1 release. We recommend early implementation as the backbone for improved IT Financial Management under the SMCz service management model.

### IBM Tivoli Decision Support (ITDS) for z/OS V1.8.

ITDS for z/OS was designed to help performance analysts, capacity planners, and IT financial accounting/chargeback analysts. It collects extensive raw system metrics data, consolidating all such enterprise-wide IT resource usage data into a central, z/OS-based DB2 repository, and provides tools to help these professionals improve operational planning, cost management, responsiveness, chargeback, and systems decision making. This repository-held data provides an invaluable basis for enterprise IT performance reporting, for IT service level management, and for IT usage accounting/chargeback, helping to show, measure, and validate the business value of IT. The comprehensive data collected, and the tool's effective, adaptable performance-reporting capabilities, also helps analysts improve system reliability and efficiency over the whole enterprise, improving IT investment Return On Investment (ROI). ITDS for z/OS tracks system performance and resource usage, helps anticipate and successfully solve problems, and adds the accountability, cost control, and delivery commitment essential for sound ISM governance. ITDS for z/OS thus provides a competitive business edge, extensively leveraging this wealth of centralized IT operations data.

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*This repository-held data provides an invaluable basis for enterprise IT performance reporting, for IT service level management, and for IT usage accounting/chargeback, helping to show, measure, and validate the business value of IT.*

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ITDS for z/OS also acts as data source to the ITUAM for z/OS Option (assessed above) that provides sophisticated usage accounting and chargeback billing for usage accurately reflecting the actual, measured usage of heterogeneous IT resources. New in ITDS for z/OS V1.8 are tighter integration with the ITUAM Option for z/OS, and new Dataset Activity, OMEGAMON for CICS, and WebSphere Message Broker V6 ITUAM sub-components (enabling data collection from these services). The product also now provides much-improved Web reporting, utilizing the Eclipse Business Intelligence and Reporting Tools (BIRT) standard to publish Web-based reports to a Web server for convenient reporting and distribution. It also benefited from improved integration with the ITEP. An ITEP agent now allows ITDS for z/OS reports to be automated, which makes it easy to publish up-to-date usage information frequently. Non-IT people can also query these BIRT reports, without IT involvement.

This release also included data collector updates for z/OS V1.8, IMS V9 and 10, DB2 V9, IBM WebSphere MQ V6, and CICS Transaction Server V3.2. It also added support for the IBM System z9 Integrated Information Processors (zIIPs) and IBM System z Application Assist Processors (zAAPs) specialty processing engines.

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*ITDS for z/OS's comprehensive, rich, enterprise-wide, System z mainframe hosted, IT data repository provides the basis for rational and efficient enterprise ISM...*

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**Analyst Comment:** ITDS for z/OS's comprehensive, rich, enterprise-wide, System z mainframe hosted, IT data repository provides the basis for rational and efficient enterprise ISM, and is a major added-value SMCz role function. Many aspects of ISM governance, compliance, IT improvement and optimization, and IT financial management, can best be based on reporting

and analysis from this rich database. The tool is also the principal data provider to the ITUAM Option for z/OS, a major foundation of SMCz's enterprise IT Financial Management capability domain.

### IBM Tivoli License Compliance Manager (ITLCM for z/OS) for z/OS V4.3

ITLCM identifies installed software inventory, measures software usage activity, and automatically links license entitlements, improving cost management and proactively managing and verifying license compliance, across whole mainframe environments. The tool also monitors software usage trends, to aid in planning financially optimal capacity upgrades/server consolidations, and to plan migrations of old-version and duplicate-function software. It easily identifies software inventory with no or low-use activity. Unnecessary license fees can thus be reduced, and expensive low-use software costs be allocated to the appropriate user department, for fairer software charge-back burdening. The product is also an invaluable aid for contract negotiations and license audits, providing all the needed vital information for both, including reports on the Million Instructions Per Second (MIPS) capacity of each LPAR under which the software is running. In addition, the tool can also improve DR planning by providing software-use activity information, thereby enabling accurate software sizing for the DR/BC site.

**Analyst Comment:** The costs of System z mainframe software (IBM and ISV) at many IBM mainframe installations often far exceeds that of the hardware, and the range and breadth of installed software products and tools is usually much higher on mainframes than on other platforms. Managing mainframe software assets to minimize their costs, whilst ensuring compliance with often-complex license agreements, is thus a crucial part of mainframe site financial management. ITLCM for z/OS provides a robust, well-proven, functionally rich supporting tool for this high-impact service management function, solving the many challenges of effective software asset management on the mainframe. ITLCM is also available for System z Linux. (ITLCM for z/OS was formerly known as Isogon SoftAudit for z/OS, and came into the IBM Tivoli portfolio via IBM's July 2005 acquisition of Isogon Corporation.) This product is also now available on System z Linux.

### IBM Tivoli Contract Compliance Manager (ITCCM) V3.7.2

ITCCM is a contract management system for the efficient management of all IT agreements, supporting contract management tasks such as management of unique agreements, license compliance assurance, preparation and maintenance of budgets,

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*ITCCM can manage all types of IT contracts, including hardware and software purchase, lease, and maintenance agreements, and can similarly also be used to organize and manage non-IT contracts.*

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tracking of invoice payments, control of password allocations, and the issuing of timely reminders of important contract dates. The product therefore enables IT organizations to centrally and efficiently manage contractual and financial details of all their IT agreements over their lifecycles. ITCCM can manage all types of IT contracts, including hardware and software purchase, lease, and maintenance agreements, and can similarly also be used to organize and manage non-IT contracts. The product

also supports IT finance/business staff in preparing for IT contract negotiation with notifications, scanned contract reviews, and key term and conditions comparisons. It also helps to manage the contract preparation, negotiation, and approval workflow processes, and tracks the associated legal document relationships. On the financial side, ITCCM can forecast expected payments and depreciation schedules, and can reconcile incoming supplier invoices with the agreement.

The product offers customizable data fields, and an intuitive UI that allows users to create and view the contract information needed for the specific tasks they need to accomplish. Templates for major software vendor licenses and metrics are included. The tool offers easy data filtering to provide quick access to detailed information. Timely notifications ensure key contract dates are not missed, and the correct actions can be taken. Organizations can also greatly improve their DR resiliency by having this organized electronic contract storage (*implemented in ITCCM*) all properly backed up on the main IT DR/BC fallback mainframes. GA August 12<sup>th</sup> 2005. (Formerly Isogon Vista, from IBM's July 2005 acquisition of Isogon Corporation.) (Windows- x86/x64 server platform only.)

**Analyst Comment:** Managing the welter of IT contracts currently in force, or under negotiation or re-negotiation, is a substantial, ongoing effort for large IT organizations, with major cost and legal ramifications. When integrated with the ITLCM for z/OS (see above), ITCCM provides significant benefits by avoiding software contract compliance violations, by helping plan more cost-effective capacity upgrades or consolidations, pinpointing where recharges are needed by helping to ensure overall contract compliance, and by providing more leverage for contract re-negotiations.

## 3.2. SMCz IT Security Management Solution Profiles

This SMCz domain is concerned with providing higher security visibility and enhanced reporting capabilities across multiple technology platforms as new compliance standards, acquisitions, business expansion and technologies are introduced. IBM's System z security, from the hardware upwards, and through the extensive IBM Tivoli System z security portfolio, has long been legendary. The foundation IBM Tivoli mainframe security management products (*for z/OS, zLinux and zVM*) are well known and established and so are not assessed here. These include the IBM Tivoli Directory Server, the IBM Tivoli Directory Server Integrator, the IBM Tivoli Identity Manager, and the IBM Tivoli Access Managers (*for eBusiness & for Operating Systems*) families.

SMCz extends IBM's leadership security, audit and compliance management software for System z with powerful, new, enterprise-wide security management visibility and reporting capabilities. These are tightly integrated with these operational security management offerings, including the IBM Tivoli Federated Identity Manager, the IBM Tivoli Compliance Insight Manager, the IBM Tivoli Security Operations Manager, and the IBM Tivoli Security Compliance Manager. In addition, the relatively new IBM Tivoli zSecure Suite speeds and simplifies mainframe security administration.

This domain was introduced, and its functions and products briefly described, in Section 7, subsection 3.2, from page 48 onwards. Here, we focus on newer, higher-level security offerings that now add important SMCz capabilities.

### IBM Tivoli Federated Identity Manager (ITFIM) for z/OS (& zLinux) V6.2

Federated Identity Management (*FIM*) provides a simple, loosely coupled model for managing identity and providing resource access across companies or security domains in a trusted fashion. ITFIM for z/OS thus helps companies using System z to collaborate securely (*sharing identity and policy data about users and services*) without replicating identity and security administration at both companies. For such companies deploying SOA and Web services, ITFIM for z/OS provides policy-based, integrated security management for federated Web services and SOA, based on trust, integrity, and data. This trust allows firms to loosely couple their disparate identity management systems, and to extend user-role-based identity and access management to third-party users and third-party services. ITFIM for z/OS is thus also an important extension of the ISM portfolio, allowing companies to cut technology complexity through this security automation and process integration.



ITFIM offers substantial benefits in many scenarios. It simplifies integration between the Web sites of the firm and its partners. It also improves business compliance by reducing security exposure. It helps integrate security between new, distributed applications and mainframe applications like CICS, and improves audit controls for host data and transactions served using SOA and Web services. It can improve the end-user experience by providing Single Sign-On (SSO) facilities. More broadly, it delivers “security as a service,” to simplify administration in cross-enterprise business processes.

ITFIM for z/OS supports open standards/specifications, including Liberty, Security Assertions Markup Language (SAML), WS-Federation, WS-Security, and WS-Trust. Firms can assume the roles of identity provider (*directly managing end-user identities*) and/or service provider (*providing services to end-users*). The identity provider in FIM is the definitive source that alone can validate an identity for a service provider, and is trusted by the service provider to do so. All SOA environments require such an identity infrastructure service to simplify the security policy management over various Web service client requestors and Web service providers. ITFIM for System z Linux V6.2 is also available.

**Analyst Comment:** ITFIM for z/OS's federated identity model allows much simpler, less cumbersome administration, improves business compliance, and lets companies extend identity/access management to third-party users and third-party services, easing the user experience. These are all-important benefits in the collaborative systems world of cross-enterprise SOA and Web services. ITFIM for z/OS V6.2 is IBM's enterprise-class, full-function, high-end FIM solution, and will be the natural foundation for SOA security for many larger, mainframe-based, SOA deployments. From a business viewpoint, it helps break down silos, can facilitate mergers and acquisitions, and helps to improve compliance and governance.

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*ITFIM for z/OS V6.2 is IBM's enterprise-class, full-function, high-end FIM solution, and will be the natural foundation for SOA security for many larger, mainframe-based, SOA deployments.*

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A companion family product, ITFIM Business Gateway V6.2 for System z Linux, provides lower-cost, entry-level FIM solutions for smaller users' FIM needs.

#### **IBM Tivoli Compliance Insight Manager (ITCIM) Enabler for z/OS V8.5.**

ITCIM enhances and accelerates audit and compliance activities for the mainframe environment (*where this is mandatory*), and integrates such activities for other platforms, within a unified, enterprise compliance insight system. ITCIM provides clear visibility of the organization's security compliance posture, via automated, enterprise-wide user activity monitoring across heterogeneous systems, including System z, against the corporate acceptable-use definitions and security policies. ITCIM offers a compliance dashboard and reporting (*100+ report types*) to display/measure the enterprise's security posture, and to respond to security auditor requests. It can automate audit reporting through its compliance dashboard, and via its flexible report distribution capabilities. The product can also perform effective Privileged User Monitoring and Audit on databases, applications, servers, and mainframes.

ITCIM is also extensible, so IT security staff can create custom compliance modules through the product's advanced report definition engine. It saves security administrators' time and effort by efficiently collecting, storing, investigating and retrieving logs through its automated log-management capabilities. The tool normalizes log data into common English, and correlates log data by combining diverse information from multiple users and systems, and matching similar data. These methods make mainframe security log information more meaningful and actionable for the non-technical people who typically conduct security audits. The tool is integrated with IBM identity management, and other security products, to help optimize compliance and incident response. ITCIM is thus integrated with IBM Tivoli Identity Manager, IBM Tivoli Access Manager, and IBM Tivoli Security Operations Manager, the other core components of the Tivoli identity management and security operations/portfolio.

**Our Analysis:** This powerful, Windows-based, enterprise solution uses a Web-based interface and sophisticated analysis and reporting tools to help auditors effectively study mainframe compliance – with little involvement required from dedicated System z security and audit staff, and without the usual complexity, time, and cost, of native System z compliance investigations. The ITCIM Enabler for z/OS component supplies the event source connection with the mainframe, and ITCIM smoothly integrates with the recently-introduced, core IBM Tivoli zSecure mainframe auditing and administration tool suite. (*See our zSecure suite assessment below for further details.*)

#### **IBM Tivoli zSecure Suite (for z/OS) V1.9.1**

The newer IBM Tivoli zSecure suite offers enhanced mainframe security administration, compliance, monitoring, and audit solutions. These provide user-friendly administration and policy enforcement of Remote Access Control Facility (RACF) security and monitoring, and auditing and alerting on RACF, Access Control Facility 2 (ACF2) and Top Secret, security-based mainframes, whilst also automating routine administrative tasks for mainframe security. (*RACF is the generic security administration/management facility for the System z mainframe, a powerful if slightly unfriendly tool in its native UI form.*)

- **IBM Tivoli zSecure Admin:** Provides a user-friendly layer above RACF which enables more efficient and effective security administration, user management, and compliance on the mainframe, using significantly less resources (*than with RACF alone*).
- **IBM Tivoli zSecure Audit:** Compliance and audit solution that automatically analyzes and reports on security events, and detects security exposures, under RACF, ACF2, or Top Secret, mainframe security regimes.
- **IBM Tivoli zSecure Alert:** Real-time mainframe threat monitoring, detection, and prevention, with alerts and automated commands to counter monitored intruder attacks, and to identify and counter mis-configurations, for improved security compliance. Operates for RACF, ACF2, or Top Secret, mainframe security regimes.
- **IBM Tivoli zSecure Command Verifier:** Robust mainframe policy enforcement solution that adds controls for RACF commands, enforcing compliance to company/regulatory policies by preventing processing of erroneous commands.
- **IBM Tivoli zSecure Visual:** Reduces the need for scarce, RACF-trained expertise by providing a Microsoft Windows-based GUI for RACF administration.
- **IBM Tivoli zSecure CICS Toolkit:** Enables security administrators to perform mainframe administrative tasks from a CICS environment, freeing up native-RACF resources.

*The zSecure suite therefore provides a considerable improvement in the productivity and efficiency of administration for RACF-based mainframe security...*

**Analyst Comment:** The zSecure suite therefore provides a considerable improvement in the productivity and efficiency of administration for RACF-based mainframe security and for enhanced auditing and real-time threat management for RACF, ACF2, or Top Secret secured mainframe sites. It also makes it easier for younger staff to work with mainframe security by providing a modern UI and form of interaction.

#### **IBM Tivoli Security Operations Manager (ITSOM) V4.1.**

ITSOM provides an important part of a centralized Security Information Event Management (SIEM) platform, able to help enterprises to improve the effectiveness, efficiency, and visibility of their IT security operations. ITSOM centralizes and stores security data from all across the enterprise's technology infrastructure, allowing automation of log aggregation, correlation, and analysis, adding significant efficiency gains through this automation, and enabling security and IT operations to better maintain service uptime. The heterogeneous sources from which ITSOM can collect security events are many, including intrusion detection and protection systems, firewalls and virtual private networks, networking infrastructure (*switches and routers*), antivirus and malicious code-protection products, plus IT infrastructure elements including server and desktop systems, and also from other security products. In typical larger enterprise networks, the total volumes of security event data generated from the large number of such sources that organizations use is far beyond manual analysis. ITSOM uses standard and native protocols, including eXtensible Metadata Platform (XMP), syslog, Simple Network Management Protocol (SNMP), Checkpoint Open Platform for Security (OPSEC), and many others, to collect these event streams.

This tool allows security incidents to be automatically analyzed, recognized, investigated, and responded to, much faster. In addition, by facilitating the flow of security incident management data between security, network and systems management operations teams, and the tool ensures operational integration between these groups, improving security management efficiency.

The automated log aggregation allows the integration of security operations across platforms, in turn allowing them to be centralized across the discrete organizations, technologies and processes normally involved; raising security operations efficiency. The tool offers comprehensive reporting, including on-the-fly data mining, historical reporting, self-auditing and tracking capabilities, that help deepen the understanding of security operations and better support audit and compliance. The product supports extensive integrations with many other IBM Tivoli tools and data sources, that are too numerous to detail further here. GA December 14<sup>th</sup> 2007. (*UNIX, Linux server only*.)

**Analyst Comment:** Overall, ITSOM provides greatly streamlined incident tracking and handling, whilst enabling more efficient, centralized monitoring and enforcement of security policies, ensuring their closer alignment with top business priorities. Modular architecture, and a choice of deployment options, adapts this tool to the needs of most organization's security infrastructures. For mainframe environment, ITSOM can receive host security event data from z/OS-forwarded syslogs, Simple Mail Transfer Protocol (SMTP) messages, and SNMP traps. It also provides a foundation for offering managed security services that reduce operational costs through automation, with quick implementation.

#### **IBM Tivoli Security Information and Event Manager (ITSIEM) V1.0**

ITSIEM combines the ITCIM and ITSOM products discussed above, to provide a more comprehensive solution for SIEM in one package. It centralizes security event and compliance policy management, providing visibility to enterprise-wide security posture that includes centralized log management, event correlation, policy compliance dashboard and comprehensive reporting capabilities. GA January 21<sup>st</sup> 2008. (*Distributed/Windows server products*.)

### IBM Tivoli Security Compliance Manager (ITSCM) V5.1.

Security concerns amongst enterprises rightly continue to grow, as they face daily increasing numbers of security incidents. In addition, enterprises must now be compliant with both corporate security policies and ever-increasing government security standards/regulations. ITSCM is an enterprise-level, security policy compliance tool, which provides early warnings by identifying security vulnerabilities and security policy violations, for any size of business. ITSCM helps these businesses define consistent security policies, and then monitors their compliance with these defined security policies. The security policies deployed may be based on both internal security requirements, and/or on industry-standard security policies. Though powerful automation, and the centralization of security compliance management, ITSCM improves business operations efficiencies, ensures enforcement consistency, and drives down costs. The software can help identify security vulnerabilities across AIX, Solaris, HP-UX, Windows, Linux, and Linux on System z systems.

ITSCM automates security scans of applications, servers and desktop systems for vulnerabilities, and identifies violations against security policies, greatly reducing the cost and time of manual security checks. It guards businesses by highlighting vulnerable software configurations, well before any security incidents exploiting those vulnerabilities can inflict costly damage. It helps businesses attain compliance with regulations and standards by automating compliance tasks, monitoring correspondence, reducing human error, and trimming back compliance costs. It also provides a full range of reports for security officers and compliance auditors, providing them with detailed information about the security health of the business, whilst guiding them towards the appropriate enhancements needed to make individual systems and departments compliant. ITSCM integrates with other IBM Tivoli automated security management tools to help mediate security policy violations and risks. (*Distributed server product, System z Linux client only.*)

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*ITSCM is an invaluable tool for enterprises that need to strengthen their security compliance with regulations, and/or to identify and fix security weaknesses and vulnerabilities in their IT infrastructure.*

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**Analyst Comment:** ITSCM is an invaluable tool for enterprises that need to strengthen their security compliance with regulations, and/or to identify and fix security weaknesses and vulnerabilities in their IT infrastructure. The software comes with pre-defined, recommended security policies to speed deployment, but these may be customized to fit specific regulatory, industry or corporate security policies. A red, yellow, green, stoplight-style warning system alerts security administrators and users as to whether systems comply with security policy; for example, red highlighting any that have dangerous or unnecessary services running.

### 3.3. SMCz IT Operations & Production Control Solution Profiles

This SMCz domain is concerned with the crucial enterprise workload scheduling and production control functions, long well-developed on the mainframe platform itself, but today made far more complex and demanding by the current widespread use of multi-tier, heterogeneous platform applications. This domain was introduced, and its functions and products briefly described, in Section 7, subsection 3.3, from page 51 onwards. SMCz today brings the more sophisticated scheduling and workload management like that of the System z mainframe to the whole enterprise IT infrastructure, enabling the extension and automation of job scheduling, workload management for all distributed platforms to be controlled and managed from a powerful System z SMCz hub role.

#### IBM Tivoli Workload Scheduler (ITWS) for System z Linux V8.4

ITWS is a service-based workload automation offering, built on SOA, with open and published Java EE™ and Web services interfaces. The tool readily integrates/aligns heterogeneous applications and systems workloads with enterprise-level business service. It is thus an important element for enabling ISM. With built-in fault tolerance, ITWS easily scales to manage high levels of activity, up to hundreds of thousands of workloads per day in production environments, from a single point of control. This provides flexibility and reliability, enables improved workload coordination, visibility, and control across the organization, increases workload velocity into existing resources, and improves operational performance and cost efficiency.

ITWS for System z Linux V8.4 adds important new features, including advanced advent-based scheduling capabilities that aids better workloads management under sharp, real-time business demand changes. Extensive Web-based reporting, with templates for production and plan workloads, and custom SQL reporting are now included. The Tivoli Dynamic Workload Console (TDWC) allows SAP workloads submission for improved mixed enterprise workload visibility and control. TDWC also supports trial and forecast planning, to fine-tune workload plans and to help raise IT resource utilization. Agentless ITWS technology provides greater flexibility in smaller workload environments. The tool is also integrated with the IBM Tivoli Enterprise Portal, bringing workload automation exceptions monitoring for a wide range of events, into this single point of enterprise management control. IPv6 support now helps provide better network routing and auto-configuration, and Lightweight Directory Access Protocol (LDAP) support allows easy user authentication within current security infrastructures.

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## *ITWS provides a powerful, foundation workload scheduler for heterogeneous applications and systems distributed platforms.*

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**Analyst Comment:** IBM Tivoli's ITWS provides a powerful, foundation workload scheduler for heterogeneous applications and systems distributed platforms. ITWS combines with its IBM Tivoli Workload Scheduler (*ITWS*) for z/OS V8.4, IBM Tivoli Workload Scheduler for Applications (*ITWS for Applications*) V8.4, and the IBM Tivoli Dynamic Workload Broker (*ITDWB*)

V1.2, (each described below) to provide a formidable enterprise workload management capability across mainframe and distributed environments. These functions are central to the delivery of the SMCz role of enterprise workload scheduling, with its central point of control on System z.

### **IBM Tivoli Workload Scheduler for z/OS (*ITWS for z/OS*) V8.3**

ITWS for z/OS is a powerful, scalable, and fault-tolerant, enterprise-level workload automation backbone that can drive heterogeneous platform workloads, minimizing idle time and improving workload throughputs for cross-enterprise operations. It enables enterprises to move up from static, platform-based views of production workloads, to a state-of-the-art, flexible, service-driven SMCz environment, employing both calendar and event-based workload automation. The tool on z/OS provides a single point of scheduling control, and for the whole IBM Tivoli Workload Scheduling portfolio, through its Tivoli Dynamic Workload Console (*TDWC*). It can schedule/run the same job multiple times per day, can define waiting times for jobs, can help with job critical path management/monitoring, and now provides enhanced loop recovery capability. ITWS for z/OS can trigger batch job, and job stream execution, based on real-time events, and will also notify production controllers when any unusual conditions occur in the IT infrastructure, or in batch scheduling activity.

New integration with the System z Workload Manager (*WLM*) prioritizes workloads by service classes, and dynamically routes workloads to the best available resources in a mainframe Sysplex cluster. It also adds enhanced integration with ITSA for z/OS, to automate System z resource utilization from within the product. It also offers enhanced integration with the ITEP to provide a new, event-driven, consolidated interface; and finally provides seamless integration with ITWS V8.4 for improved correction capability and fault recovery in integrated, end-to-end scheduling environments. ITWS for z/OS V8.3 can also now connect distributed Standard Agents and Fault Tolerant Agents directly to a z/OS Master Domain Manager without the need to use a distributed Domain Manager, bringing a lighter-weight scheduling network with lower cost of ownership.

**Analyst Comment:** This product is central to the SMCz role's enterprise-wide workload scheduling/management functions, and this release has been significantly enhanced to include better integration with the other key IBM Tivoli offerings (*discussed above*) that complement it. It substantially eases and simplifies enterprise workload management by providing real-time alerts and user notifications, and by its sophisticated self-monitoring, self-healing, automated recovery, and user-defined event rules for batch jobs scheduling. ITWS for z/OS is also closely coupled with the central IBM Tivoli System Automation for z/OS product (*see below*), the powerful operations automation software engine on the mainframe.

### **IBM Tivoli Workload Scheduler for Applications (*ITWS for Applications*) (for z/OS & System z Linux) V8.4**

ITWS for Applications applies the sophisticated workload management capabilities of ITWS, and of ITWS for z/OS (*discussed above*) to Enterprise Resource Planning (*ERP*) application environments. It extends ITWS software with extensive awareness of, and interfacing into, ERP applications, and leverages the built-in workload capabilities of Oracle e-Business Suite, PeopleSoft, SAP R/3, and SAP Business Warehouse, coordinating their workload automation across mainframe and distributed environments. New features of ITWS for Applications V8.4 include better SAP event monitoring/scheduling for more consistent dynamic scheduling over mixed, inter-dependent, heterogeneous applications and systems. It also offers automatic import and synchronization of SAP calendars to provide more consistent visibility that helps to provide more control over ERP workloads. ITWS for Applications is available for z/OS and for System z Linux.

**Analyst Comment:** This product delivers the power and heterogeneous environment workload scheduling support of the ITWS family products above, to the Oracle e-Business Suite, PeopleSoft, SAP R/3, and SAP Business Warehouse ERP environments, complementing their native workload capabilities for better integration of these ERP platforms in mixed, enterprise-wide applications.

### **IBM Tivoli Dynamic Workload Broker (*ITDWB*) V1.2**

ITDWB turns static IT infrastructures into dynamic, virtualized environments by dynamically routing workloads to the best available resources. This eliminates staff-intensive efforts, both to manually re-plan workload assignments across heterogeneous resources, and to resolve unplanned IT infrastructure incidences. ITDWB automatically adapts workload execution in real time, when changes occur in the IT environment, to make sure production plans are executed, and to increase workload velocity by more fully exploiting all available assets. New features of ITDWB V1.2 include advanced auditing/reporting services that easily demonstrate government regulation and enterprise controls compliance. Platform support has been extended to include Solaris and HP-UX operating systems, allowing ITDWB to integrate and virtualize these distributed IT infrastructure platforms.

**Analyst Comment:** ITSWB adds dynamic workload brokering and routing to the powerful and integrated IBM Tivoli heterogeneous enterprise-wide workload management portfolio mentioned above; an important, advanced capability.

### IBM Tivoli System Automation (ITSA) for z/OS V3.2

This product is an important foundation for end-to-end automation of mainframe-based applications, fully exploiting the extensive IBM autonomic computing initiative advances. ITSA for z/OS is thus the primary IBM Tivoli automation product for building an end-to-end autonomic computing operational management solution.

ITSA for z/OS helps customers with single z/OS systems, or with Parallel Sysplex clusters, simplify their management, minimize operating costs, and deliver maximum application availability. It fully automates a gamut of mainframe Input/Output (I/O), processor, and system operations. The product also includes “out-of-the-box”, ready-to-use automation workflows for IMS, CICS, Tivoli Workload Scheduler, DB2, mySAP, and WebSphere. The latest ITSA for z/OS V3.2 release includes many new functions and enhancements. These include ITEP support, event-based monitoring using monitor resources, OMEGAMON XE integration, and improved availability and recovery time reporting on the PA/PM front. Extended status command support and enhancements to the customization dialog have been added, and ITSA for z/OS commands have been improved. Significant enhancements have been made to group behavior, to Write To Operator with Reply (WTOR) processing, to automation flag processing, to I/O operations, and to processor operations. Alert/Escalation via ITSA for IOM (see below) is now supported, reporting had been enhanced, and various other areas improved.

**Analyst Comment:** ITSA for z/OS has played an important part in radically extending the automation of System z single and Sysplex cluster operations, fully exploiting IBM’s extensive autonomic computing advances of recent years. Now robust, full-function, and mature, this latest release adds further significant advances to this central ISM delivery foundation for the mainframe.

### IBM Tivoli System Automation (ITSA for IOM) for Integrated Operations Management V2.1

ITSA for IOM is a workstation-based, outboard automation tool for secure, remote access to mainframe and distributed systems, regardless of their location. ITSA for IOM provides integrated access to these systems via the Transmission Control Protocol/Internet Protocol (TCP/IP) network or dial-up, so remote administrators can use the same TN3270 console emulation functions as data center operators. The product’s master console combines data from many different consoles (including z/OS and other ASCII console systems) into a single, secure, multifunctional access point into many platforms, for convenient status checks and intervention. ITSA for IOM also provides communication/integration between mainframe and distributed system automation/monitoring tools, with powerful IBM Restructured Extended Executor Language (REXX) programmatic capability enabling it to respond to platform events, and to integrate with standard industry automation packages/frameworks. The product exploits customer monitoring tool investments, by being able to take automatic actions based on console messages from across the data center.

ITSA for IOM’s outboard (out-of-band) automation also accesses mainframe systems for Initial Program Load (IPL) and Virtual Telecommunications Access Method (VTAM) initiation, can alert to z/OS problems, and can automate impossible-to-automate-tasks in programs run on the mainframe operating system itself. ITSA for IOM also provides enhanced automatic notification and escalation of problems via e-mail and wireless devices, providing user alerts (with text and graphics) based on system messages, so that impending problems are known and can be solved before they affect customers.

**Analyst Comment:** This versatile, useful outboard automation tool significantly helps to improve staff productivity and service quality by providing capabilities to remotely automate and manage data centers, mainframes, distributed computers, and other third-party systems, to ensure that all events are automatically responded to, and all problems are corrected. This tool thus fulfils an important, centralized, remote management role in the SMCz model for ISM. This IBM Tivoli enhancement/extension/new release is derived from its long-proven Candle AF/REMOTE (aka also IBM Tivoli AF/Remote) predecessors.

**IBM Tivoli Decision Support (ITDS) for z/OS V1.8** – See profile under Appendix C, domain 3.1 on page 69.

## 3.4. SMCz IT Performance Monitoring & Management Solution Profiles

This SMCz domain is concerned with delivering optimal performance and SLA through a comprehensive view of mainframe operations performance, as well as that of other platforms. SMCz delivers this by tightly integrating the ITEP with the IBM Tivoli OMEGAMON monitoring family for System z and the IBM Tivoli Composite Application Manager (ITCAM) family. Also integrated closely with ITEP are IBM Tivoli NetView, IBM Tivoli System Automation for z/OS, and the IBM Tivoli Workload Scheduler family, as well as the security monitoring products (see domain 3.2 above) and others.

SMCz domain benefits include increased visibility, expert advice and automation support for system performance, enhanced network performance, and improved delivery of critical business applications, from the ITEP single point of monitoring and management control hosted on the System z.

This domain was introduced, and its functions and products briefly described, in Section 7, subsection 3.4, from page 52 onwards. Most of these PM/PA operational management products for System z are today relatively well established, well known and understood, so we only profile new or less familiar offerings in this category below.

**IBM Tivoli Enterprise Portal** – See profile in Appendix C, domain 2, on page 65.

**IBM Tivoli OMEGAMON XE** family, most for z/OS, and most at **V4.1.0** release level

The IBM Tivoli OMEGAMON products family provides comprehensive performance and availability solutions to proactively analyze and manage operating systems, databases, or other mainframe environments, for optimal performance. The latest versions are advanced PA/PM tools, heavily developed by IBM from its Candle Corporation acquisition assets, and embedding the resulting advanced autonomic lightweight and scalable architecture monitoring technologies. The family of tools helps detect bottlenecks and identify other potential performance problems from multiple viewing points, enabling IT operations to rapidly pinpoint and take action automatically to resolve detected issues. All the OMEGAMON XE products are integrated tightly with the ITEP portal discussed above (*which was derived from CandleNet Portal technology*). The extensive OMEGAMON XE family now includes products to monitor/manage all the main mainframe subsystems, and selects other environments from System z under SMCz. These now include (*names below are all “IBM Tivoli”-prefixed*):

- **OMEGAMON XE for CICS on z/OS:** Centrally monitors/manages CICS transactions and interactions with other applications.
- **OMEGAMON XE for DB2 Performance Expert on z/OS:** Powerful tool to optimize efficiency of z/OS DB2 databases.
- **OMEGAMON XE for DB2 Performance Monitor on z/OS:** Monitors, analyzes, and optimizes performance of, DB2 database and applications on z/OS.
- **OMEGAMON XE for IMS on z/OS:** Optimize performance and availability of vital high-volume IMS systems on z/OS.
- **OMEGAMON XE for Mainframe Networks:** Analyzes TCP/IP performance over CICS, DB2, IMS, and other key systems.
- **OMEGAMON XE for Messaging for z/OS:** Manages and configures WebSphere MQ, Message Broker, and InterChange Server.
- **Tivoli OMEGAMON XE for Messaging for Distributed Systems:** Performance monitoring and management for complex, multi-platform WebSphere MQ and WebSphere Message Broker messaging environments.
- **OMEGAMON XE for Microsoft .NET:** Proactively monitors and manages Microsoft .NET environments, and all their main servers, for improved availability, resource control, and performance.
- **OMEGAMON XE for Storage on z/OS:** OMEGAMON XE monitor for System z z/OS I/O sub-system performance and storage availability.
- **OMEGAMON XE for WebSphere Application Server on Distributed Systems:** Monitors and centrally administers the performance and availability of WebSphere Application Server (WAS) Web applications across distributed platforms in production.
- **OMEGAMON XE for WebSphere Application Server on z/OS:** Provides performance management capabilities for WebSphere Application Server on z/OS
- **OMEGAMON XE on z/OS:** The flagship of the family. Provides a performance and availability monitor for z/OS and OS/390 environments.
- **OMEGAMON XE on z/VM and Linux:** Manages performance and availability of z/VM and Linux on System z.

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*The OMEGAMON family was long the industry leader for mainframe monitoring; IBM Tivoli’s acquisition further strengthened, increased R&D, and accelerated releases of, this market-leading monitoring family.*

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**Analyst Comment:** The OMEGAMON family was long the industry leader for mainframe monitoring; IBM Tivoli’s acquisition further strengthened, increased R&D, and accelerated releases of, this market-leading monitoring family. The same, common core monitoring technologies used in the IBM Tivoli OMEGAMON XE suite have now completely superseded the earlier (*V5.1 and before*) in-house-built IBM Tivoli monitoring offerings. When combined with IBM Tivoli’s composite application, event, network and service-level management solutions, these tools ensure that

IT resources and staff are operating efficiently and effectively.

### **IBM Tivoli Monitoring family (ITM) V6.2**

The latest version of IBM’s enterprise-class PA/PM monitoring product family for distributed platforms, including those running Windows, main UNIX, and Linux, operating systems. ITM is based on common IBM Tivoli advanced autonomic-based monitoring technologies as are used in the OMEGAMON XE brand product family for System z mainframes discussed above, and also presents monitoring results back into the common ITEP portal interface for a single point of management control. A similarly extensive family of ITM Editions include Express, for Applications, for Business Integration, for Cluster Managers, for Databases, for Energy Management, for Messaging and Collaboration, for Microsoft .NET, for Microsoft Applications, for Network Performance, for Transaction Performance, for Virtual Servers, and for Web Infrastructure. The ITM family supports the AIX, HP-UX, i family, Sun Solaris, and Windows operating systems.

## IBM Tivoli Performance Analyzer (ITPA) V6.2

Adds predictive/forecasting capability to ITM (*discussed above*), enabling focus on future performance issues in distributed environments, using existing ITM agents. The tool is integrated with ITM and with the ITEP (*where it can deliver customized workspaces containing graphs, events and status information*). ITPA provides simple and intuitive forecasting of resource, this tool enables operations staff to understand resource consumption trends, identify problems, resolve problems more quickly, and predict and avoid future problems. It is also an invaluable support for capacity planning efforts by planners; embedding built-in knowledge of distributed systems.

## IBM Tivoli Composite Application Manager (ITCAM) for XYZ family

IBM Tivoli's sophisticated family of application performance and availability management tools, geared to increase performance and availability of business-critical applications end-to-end across diverse enterprise distributed and/or mainframe environments. ITCAM products offer real-time problem detection, analysis and repair to maintain availability and performance of many types of applications. Composite application components managed may be running on multiple servers, across different platforms and Java EE™ environments, including on the System z mainframe. ITCAM offerings provide a cohesive set of integrated tools to simplify the usual high complexity in understanding/solving application-related problems and performance issues demanding an end-to-end, whole application view over all levels of application infrastructure. ITCAM uses a common data model layer to enable a consistent view of information across all components and agents, and consolidates results into the role-based ITEP. The ITEP portal itself also provides SSO to all ITM data and management tools for server management, application management, transaction management and advanced management capabilities.

ITCAM manages the full range of applications found in complex IT environments, including SOA applications and platforms, enterprise applications, Web services, databases, Microsoft applications, and operating systems. It also supports strategic data center transformation projects, including consolidation, virtualization or hosting. The breadth of application environments ITCAM offerings now manage can be seen by the following broad current range of "ITCAM for XYZ" Editions offered:

- for Applications.
- for Internet Service Monitoring.
- for Java EE™.
- for Response Time Tracking.
- for Response Time.
- for SOA Platform.
- for SOA.
- for Transactions.
- for Web Resources.
- for WebSphere.

The three major ITCAM offerings are:

- **IBM Tivoli Composite Application Manager for SOA V7.1:** Designed specifically for SOA, this composite application management tool monitors, manages, and controls the SOA Web services layer of IT architectures. The tool can identify sources of bottlenecks/failures, and can pinpoint which services are using most resources, across heterogeneous SOA platforms.
- **IBM Tivoli Composite Application Manager for Internet Service Monitoring V6.0.1:** Tests/monitors the availability, response time, and usability of Internet applications and services from a user perspective. The tool can simulate user transactions and will provide user-side performance and availability metrics by acting like a customer, end user, or another system. Includes a highly scalable 23-monitors suite, to measure services availability, performance, and content, through periodic polling from distributed points of presence.
- **IBM Tivoli Composite Application Manager for Response Time Monitoring V6.2:** Offers easy-to-use availability and response-time monitoring of both real and robotic transactions, to help monitor business operations. The tool monitors end-user response times, helping visualize transaction paths through application systems, and shows the response-time contributions of each step/component. It can also record and playback synthetic transactions for performance testing, and can help automate business processes.

**Analyst Comment:** Embeds core technology from IBM's 2004 Cynea acquisition, which was challenging quite well for application management market segment leadership when still independent. Boosted by IBM Tivoli extensions and high investments, this now extensive ITCAM family provides IBM Tivoli's enterprise application management portfolio, making IBM highly competitive in this important system monitoring and management sector, where it competes with CA-Wily, Oracle-BEA, and HP (*Mercury*), amongst others.

## IBM Tivoli NetView (ITN) (for z/OS) V5.3

ITN is a long-established, near-generic IBM brand, host-based enterprise network management product suite. Its latest release extends traditional enterprise network management and helps to ensure the availability of critical business systems. ITN discovers TCP/IP networks, displays network topologies, correlates and manages events and SNMP traps, monitors network health, and gathers network performance data. It integrates with leading network vendor management tools, such as CiscoWorks2000, maintains an enterprise network device inventory for asset management, and reports on network trends and analysis.

**Analyst Comment:** Long IBM Tivoli's flagship network management offering on host platforms, ITN measures network availability and provides fault isolation for problem control and management. Today, it also supports distributed platforms to provide a scalable, distributed and host network management solution able to quickly identify root causes of network failures. In addition, IBM Tivoli Netcool/OMNIBus, see below, provides powerful and modern, high-volume network management for the largest and most demanding TCP/IP networks,

### **IBM Tivoli Netcool/OMNIBus for System z Linux**

Extensive, advanced, consolidated network operations management and automation offering for real-time, around-the-clock, network service management, which is able to deliver central point management for complex network and IT operations. The product is highly scalable, from the smallest to the very largest and most complex environment, and over many elements like business applications, myriad network devices, various Internet protocols, and large numbers of security devices, etc. Extended from the Netcool family technology bought-in by IBM Tivoli's 2006 Micromuse acquisition.

Micromuse was then a leading provider of network management software widely used by large banks, telecommunications carriers, governments, retailers and other firms, to monitor and manage their sophisticated network technology infrastructures supporting converged voice, data, and video, network traffic. Breadth of coverage, rapid deployment, ease of use, high resilience, and exceptional scalability as well as performance are the reasons that leading organizations in such sectors worldwide have adopted IBM Tivoli Netcool/OMNIBus to manage the world's largest (*some users handle 10M+ events/day*), most complex network environments. Now a central part of the IBM Tivoli portfolio, the IBM Tivoli Netcool/OMNIBus family helps enterprises to centralize and manage large, IP-based, next-generation networks, across complex data centers, network operations centers, and IT domains, in real time, for increased efficiency and productivity, reduced costs, and improved service availability and resiliency. Customizable, lightweight agents are used to collect business and technology events from more than 1,000 sources in real time. IBM Tivoli Netcool/OMNIBus improves network service availability and reliability through automated event correlation, isolation and resolution capabilities that enable quicker identification and resolution of critical problems across operational silos via real-time Web dashboard views, with customizable displays of events, service views and operational indicators. It supports current and evolving standards, including ITIL, eTOM, IPv4 and IPv6,

and uses Federal Information Processing Standard (FIPS) 140-2 approved cryptographic providers to help ease security audits. Tivoli Netcool/OMNIBus platforms now include Windows, Sun Solaris, and Linux on IBM System z.

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*IBM Tivoli Netcool/OMNIBus solutions offer advanced, high-volume, real-time IP network monitoring, management, and problem resolution capabilities.*

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**Analyst Comment:** Based on Micromuse's network service provider-focused, very large IP-network management space, the IBM Tivoli Netcool/OMNIBus solutions offer advanced, high-volume, real-time IP network monitoring, management, and

problem resolution capabilities. As more enterprise converge their voice and data networks on IP technologies, sharply expanding their number of end-points and nodes, IBM Tivoli Netcool/OMNIBus's high-scale capabilities are ideal to manage these bigger, merged enterprise networks. IBM has built tight integration with the ITM families mentioned above, and also to monitor IBM Tivoli Netcool/OMNIBus itself, so as to generate alarms based on user-defined thresholds. Integration with a wider spectrum of the Tivoli portfolio also provides a single, clear view across operations, including cross-domain correlation, and common visualization, navigation, security and reporting, and launch-in-context capabilities (*via ITEP*).

### **IBM Tivoli Information Management (ITIM) for z/OS V7.1.**

ITIM for z/OS centralizes the management of enterprise IT incidents on the System z mainframe platform, to help the IT department resolve service outages and other problems more quickly, before incident costs rise and before business customers and users lose patience. It provides a cost-effective, scalable, and responsive incident management solution that can scale up to hold up to 400GB of information in its incident database. The tool is highly available, needing little downtime because its database may be accessed whilst automatic backup and recovery tasks are run in the background. It allows IT operations teams to further automate problem detection and service-request ticket creation, through the product's closer integration with the many other IBM Tivoli monitors reviewed above. The APIs offered also allow IT operations to easily funnel data from other applications directly into ITIM for z/OS. The product provides extensive insight into incident management, offering 100 ready-to-run reports, as well as an Open Database Connectivity (ODBC) interface enabling data to be delivered into Excel and Crystal Reports.

**Analyst Comment:** Renamed and repurposed, was previously IBM Tivoli Service Manager.

### **Tivoli Web Access for Information Management (ITWAFIM)**

ITWAFIM combines the IT incident management database capabilities of ITIM for z/OS (*discussed above*) hosted on a mainframe, with a Web browser application that helps IT support to resolve problems more quickly, and helps to improve management of the business IT environment. ITWAFIM effectively extends ITIM for z/OS to desktops, and to mobile devices that are able to support a Web browser. This delivers an easy-to-implement problem and change management solution suitable for help desk staff, developers, managers, and non-technical users. The product includes a toolkit for customization support, with a HyperText Markup Language (HTML) generator removing the need to create HTML records from scratch.



IBM Tivoli software product naming practice (*like some other IBM software offerings*) uses product names up to a sentence long, rather than the classical, short and memorable naming (e.g. “Tiger”, “Zeus”, “M5”, etc.) recommended in brand management textbooks. All are generally prefixed by “IBM Tivoli”, and mostly end with the word “Manager”. Full IBM Tivoli product names today range from four to seven words in root length, often extended further with platform specification (e.g. “for z/OS”), and/or version/release detail (e.g. “V7.1”). Throughout this White Paper, we used short, acronym-style product name abbreviations, after spelling out the full name when first introduced within each Section. Whilst poking gentle fun at these lengthy IBM Tivoli product names is easy, the compensating benefit is that these full names are fairly descriptive, specific, and so easy to understand. Acronyms, made up from their initial letters of the world in the name, can readily be used for shorthand reference compactness as we did here.

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## Related Software Strategies In-depth Mainframe Research

1. **“New IBM Smart SOA, Enterprise Modernization, & AD Software Powers System z’s Enterprise-wide SOA Role.”** White Paper, 2nd edition, published July 2008, 72 p.p., 19 charts & tables. (*In-depth assessment of IBM’s world-leadership System z Smart SOA, and associated IBM Rational advanced Application Development (AD)/Enterprise Modernization (EM) tooling at mid-2008.*)
2. **“Impressive Multi-billion Dollar 2008 System z, Software Advances – Will Bring Thousands More Mainframe Sites.”** Executive Paper, published July 2008, 20 p.p., 10 charts & tables. (*High-level executive summary assessments of all four of IBM’s 2008 strategic software domain advances, where these will expand mainframe base, and enhance new System z10 EC.*)
3. **“Impressive IBM Tivoli Service Management Center for System z – Exploits z Strengths to Deliver Service Management Enterprise-wide.”** Executive Paper, published May 2008, 18 p.p., 6 charts & tables. (*High-level executive assessment of IBM Tivoli’s powerful, new Service Management Center for System z (SMCz). Companion to this Paper.*)
4. **“System z Central to IBM’s Burgeoning Information on Demand – Cognos Buy, New IOD Software Powering Strong Growth.”** White Paper, published March 2008, 62 p.p., 18 charts & tables. (*An in-depth assessment of IBM’s impressive, now comprehensive, IOD strategy and product portfolio for System z at Q2 2008.*)
5. **“Mass Distributed Server Consolidation – System z Mainframe Linux-on-z/VM Extreme Virtualization far Outclasses Overhyped x86/x64 Approaches.”** White Paper, published January 2008, 72 p.p., 27 charts & tables. A standalone Executive Summary of this major Paper is also available. (*In-depth study of scale-out distributed computing problems, and discusses how Linux-on-z/VM extreme virtualization enables mass-consolidation onto System z for huge savings.*)
6. **“2007 Strategic Competitive Analysis – Retooling the Resurgent Mainframe for SOA – IBM’s z/OS Problem Determination Tool (PDT) Suite Pulls Ahead.”** White Paper, New Edition, published June 2007, 42 p.p., 16 charts & tables. (*Comparative assessment of five main System z z/OS PDT suites.*)
7. **“Managing System z Mainframe SOA Environments – Strong IBM z/OS SOA Software Advances Key.”** White Paper, published January 2007, 66 p.p., 26 charts & tables. (*In-depth assessment of System z9 mainframe as prime enterprise “SOA central” platform in 2007. Focuses on “second-generation” SOA adopter issues: securing, managing, and virtualizing enterprise SOA environments.*)
8. **“Top 15 Reasons Users Should Stay On/Upgrade/Move on to the IBM Mainframe.”** White Paper, published December 2006, 30 p.p., 6 charts & tables. (*Hard-hitting, outspoken short Paper highlighting the 15 Top Reasons users should stay on the System z mainframe platform, or migrate to it, from 2007.*)
9. **“New System z9 Mainframes Hit Mid-market, Refresh Top End – Powerful New SOA & Data-serving Software Delivers New Enterprise-wide Roles.”** White Paper, published July 2006, 60 p.p., 21 charts & tables. (*In-depth assessment of System z9 BC & z9 EC mainframes, HW/SW capabilities, TCO leadership and 2006 System z SOA middleware stack advances.*)
10. **“Information as a Service Unfolds – System z9 Mainframe/DB2 Premier Data & Information Server for SOA.”** White Paper, published February 2005, 74 p.p., 30 charts & tables. (*Evaluated IBM’s “Information as a Service (IAAS) strategy, product portfolio, and the System z9 mainframe’s enterprise-wide IOD/IAAS hub role.*)
11. **“SOA Takes Off – New WebSphere SOA Foundation Extends IBM’s Lead with New System z9 Mainframes as the Hub of the Enterprise.”** White Paper, published November 2005, 56 p.p., 20 charts and tables. (*Assessed case for adopting SOA, and IBM SOA Foundation WebSphere software, methods and services, on the System z9/z Series mainframe.*)
12. **“Spectacular System z9 Mainframes Leap Ahead with Doubled Power, Enterprise Hub Roles – Virtualization, Security, Availability, SOA & Value Advances.”** Enterprise Server Spotlight Report, published September 2005, 72 p.p., 28 charts and tables. (*In-depth assessment of IBM System z9 109 mainframe hardware, operating system, middleware, storage and virtualization capability.*)
13. **“New Power-driven, High-end and Modular Enterprise Storage Systems – Game-changing Server Technologies/Advances Supercharge IBM’s Storage Market Leadership Bid.”** White Paper, published November 2004, 42 p.p., 21 charts and tables. (*In-depth technology assessment of IBM’s DS6000 & DS8000 enterprise storage systems when delivered.*)

## About Software Strategies

Software Strategies is a specialist analyst firm focused on enterprise IT platform strategies and issues. Specialist expertise on mainframes, servers, operating systems, and on middleware software/tools have been our common threads. Since 1997, we have worked closely with numerous industry leaders, including: IBM; Unisys; Microsoft; Intel; Misys; Fidelity National Information Systems; CA; BMC; Stratus Computers; ICL; NetIQ; and others. Many tens of thousands of Enterprise IT users have benefited from our authoritative reports, white papers, and our presentations at scores of IT events, seminars, and conferences.

## Author



This new White Paper was researched/written by Ian Bramley, Managing Director of Software Strategies, and was published in September 2008. The views expressed are those of Software Strategies alone, and are based on our proprietary research. Ian founded Software Strategies in 1997. He is an experienced enterprise infrastructure analyst, has published scores of popular reports and white papers, and has served as a keynote speaker at many industry events. Previously, he was Director of Enterprise Platforms at Butler Group, and Founder/Chairman of the Enterprise NT Management Forum industry group from 1998 to 2001. Previously, he held executive positions with four international software/service vendors over a 25-year, prior IT industry career.

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