Multi-billion Dollar 2008 System z10, Software Advances – Will Bring Thousands More Mainframe Sites

About this Executive Paper

*During the first half (1H) of 2008, IBM launched four major System z software domains, complementing its new System z10 Enterprise Class (z10 EC) mainframes. These software advances flowed from near-$25 billion of IBM Software Group investments spanning five years. They harnessed many thousands of IBM staff, and integrated over 45 IBM Independent Software Vendor (ISV) acquisitions. These domains enable System z to serve as an ideal enterprise-wide hub for **Service Oriented Architecture (SOA)** (the new generation of enterprise applications), **Information On Demand (IOD)**, and **Business Service Management**, whilst also adding powerful **Application Development/Enterprise Modernization (AD/EM)** tools.*

This new Executive Paper reviews current business challenges, assesses IBM's new System z10 mainframe, and reviews these four crucial new System z software domains. We assess why current mainframe users should now rapidly adopt these. We also highlight where and why enterprises should best now add new System z10 machines, to strengthen their infrastructure and to exploit these dramatic software advances released.

1. Wrenching 2008 Business Challenges Demand New IT Solutions

2008 Brings Tougher Times – Introduction

As C-level business and Information Technology *(IT)* executives assess enterprise strategic directions and business challenges, they face a far tougher environment from mid-2008. Radical business transformations are now often vitally needed. The benign business climate of the prior five years changed sharply for the worse with recent trends, for most industries and economies. Only for a lucky few sectors were these changes for the better.

Transforming enterprise business models, streamlining core business processes, and gaining productivity advances in this harsher climate, all depend centrally on new IT solutions, applications, and infrastructures. IT remains the largest contributor to global business productivity gains, accounting for over 50% of the actual gains made, as cited in leading studies.

However, radical changes in the business of IT itself are also now needed in many enterprises, as sprawling, distributed IT infrastructure have pushed operational costs and power usage skywards.

Fortunately, dramatic improvements in enterprise IT infrastructures are now possible, extreme virtualization allows massive IT consolidation, and hugely powerful, far more flexible software development and integration models have emerged. New ways of delivering accurate, enterprise-wide information are at last a reality, and process automation with best practices can sharply reduce IT operational labor and total costs.

IBM System z10 mainframe, with this powerful new software, offers considerable scope to deliver real business transformation, plus large improvements in "the business of IT"

We found the new IBM System z10 mainframe, with this powerful new software, offers considerable scope to deliver real business transformation, plus large improvements in "the business of IT", both now vitally needed.

Why This Executive Paper?

Our statements above pose important questions for enterprise chief officer *(C-level)* business and IT executives:

- How can they steer their enterprises to meet the harsher global business challenges that most face from mid-2008?

- What new IT-enabled, business-transforming solutions offer proven bottom-line benefits?

- What roles should IBM's new System z10 Enterprise Class *(z10 EC)* mainframes play here?

- How do IBM's added mainframe software domains help enterprises meet their business challenges?

- How should CEOs and CIOs assess and exploit these important advances?

- Where should additional/new System z mainframes now be added into enterprise IT infrastructures?

This new Executive Paper addresses these issues strategically. Its findings are based on four, recent, in-depth, 2008 Software Strategies White Papers which assessed these IBM System z software domains. *(See page 20.)*

Challenging Mid-2008 Business Climate – Demands IT-enabled Solutions

2008's credit crunch, plus rocketing oil, food, and commodity prices, sharply changed the global business climate for enterprises in many sectors. Since the last recovery *(post dot.com bust – 2002/03-on)*, world business enjoyed 5-6 years of healthy growth and globalizing markets. Low inflation, low interest rates, ready credit for new investment, widespread stock market gains, surging growth for the BRIC *(Brazil, Russia, India, & China – and similar)* economies, an active worldwide Mergers and Acquisitions *(M&A)* scene, plus much impact from private equity ownership, were features. However, by mid-2008, that benign business picture darkened. We now see:

- **Falling property values** *(USA, UK, Ireland, and Spain, etc.)* after near-bubble property over-investment, price growth, and far-expanded lending, much property-asset-backed lending is now "in the danger zone". For example, the US sub-prime mortgages sector that triggered the global credit crunch. Building/construction/property, and related supply, industries in these markets saw sharp sales downturns, pushing their stock prices steeply down, and slowing national economies.

- **Major financial institution near-collapses and rescues**. Caused by unwise property-related, or uncontrolled speculative, investments, examples were Northern Rock *(UK)*, Society Generale *(France)*, and Bear Stearns *(USA)*. Banking/investment firm stock prices fell sharply as their bad debt write-offs proliferated. Serious concerns over bank risk management, as well as regulator shortcomings, persist.

- **A severe lending drought**, as funding sources for business investments dried up, making new capital far harder to obtain. Credit sources dried up, bank lending was sharply restricted, and market fund-raising became tougher, whilst interest rates increased, sharply raising borrowing costs.

- **Soaring oil/energy and world food prices**, following a long-running other metals/commodities boom. Caused by soaring demand for all these resources, notably from China and India, outrunning supplies, with speculation adding price pressure. Impacts have been wide-ranging already. Two dozen airlines have already failed in 2008, confronting that industry with wrenching change/consolidation if current record fuel prices persist. Citizens in the poorest countries may now even face starvation, unless enough food aid can be given, but donor funds now buy far less.

- **M&A Boom Slowed Sharply**. Record levels of M&A activities were seen across many industries and geographies. Top prices were often paid, and fundraising through debt or rights issues was easy. That boom has sharply slowed, market prices retreated, and debt capital is now scarcer – but distressed asset-buy opportunities abound for private equity firms with strong nerves and deep pockets.

- **Higher inflation**. Higher interest rates/financing costs, plus the above commodity price rises, sent inflation rates sharply upwards in most Western countries, slowing their economies. High energy and food price rises are especially devastating to poorer groups in societies, and to whole developing nations and their people.

- **Enterprise under-performance or "surprises" quickly punished**. Today, investors severely punish managements/boards that deliver results below expectations, or inflict "nasty surprises". Their share prices often plummet, and executive and/or board changes are now often demanded.

- **Global warming, carbon neutrality and Green IT**. Driven by public and stakeholder concerns, enterprises must now aim at carbon neutrality to help limit global warming. This has now become an important governance issue. IT, consuming 2% of global energy, must now clearly play its part in achieving corporate energy saving.

These factors hit widely, often harshly, on most sectors, but a few lucky industries and geographies profited greatly. Winning companies and countries were those active in oil and gas production, mining and minerals, and food production and distribution, etc.; each enjoying soaring prices and profits, if not popularity.

Today, most business initiatives for transforming business processes and performance under such challenges crucially depend upon advanced IT applications solutions and infrastructures. Such IT investments are increasingly important, as firms struggle for business performance and productivity gains in these more adverse conditions.

Our Analysis – Major Business Change-enabling IT Solutions Needed

We found that fifteen IT-enabled business improvement solutions account for worldwide 2007-2008 enterprise IT investment. As companies wrestle to surmount the deep business challenges mentioned above, these IT solutions provide major sources of the business improvements needed. The fifteen are summarized in Figure 1, and brief descriptions of each are given in Appendix A of this Paper, for clarity and understanding.

We strongly advise companies to maintain, or better still to increase, IT investments into the most appropriate combination of these solutions, during these harder times. Only such firms will emerge ahead of their competition when their markets finally recover from current shocks.

These IT investments each bring vitally needed, higher business performance and productivity that today's tougher business climate now demands – what is the "most appropriate combination" to invest in? The answer to this is that "every enterprise will differ".

IBM Global Business Service offers the compelling **Component Business Model** *(CBM)* approach to guide business strategy for each vertical industry. Each CBM graphically highlights the main business processes and systems that are most important in that industry. With a CBM an individual company can be rapidly rated on all critical process/system areas, compared to industry peer-group best practices. *(From IBM's experience in helping many similar firms.)* This process identifies the highest priority, IT-enabled *(and other)* business improvements of greatest impact and highest Return On Investment *(ROI)*. We commend this well-proven, capable approach to strategic business improvement project selection.

Our research found that the latest IBM System z10 EC generation mainframes, combined with the much-augmented IBM System z software stack, now provides a robust, full-function, central enterprise hub IT platform. This hardware/software platform combination, we found, is now well-equipped to host/deliver the strategic enterprise business improvement solutions shown in Figure 1 below.
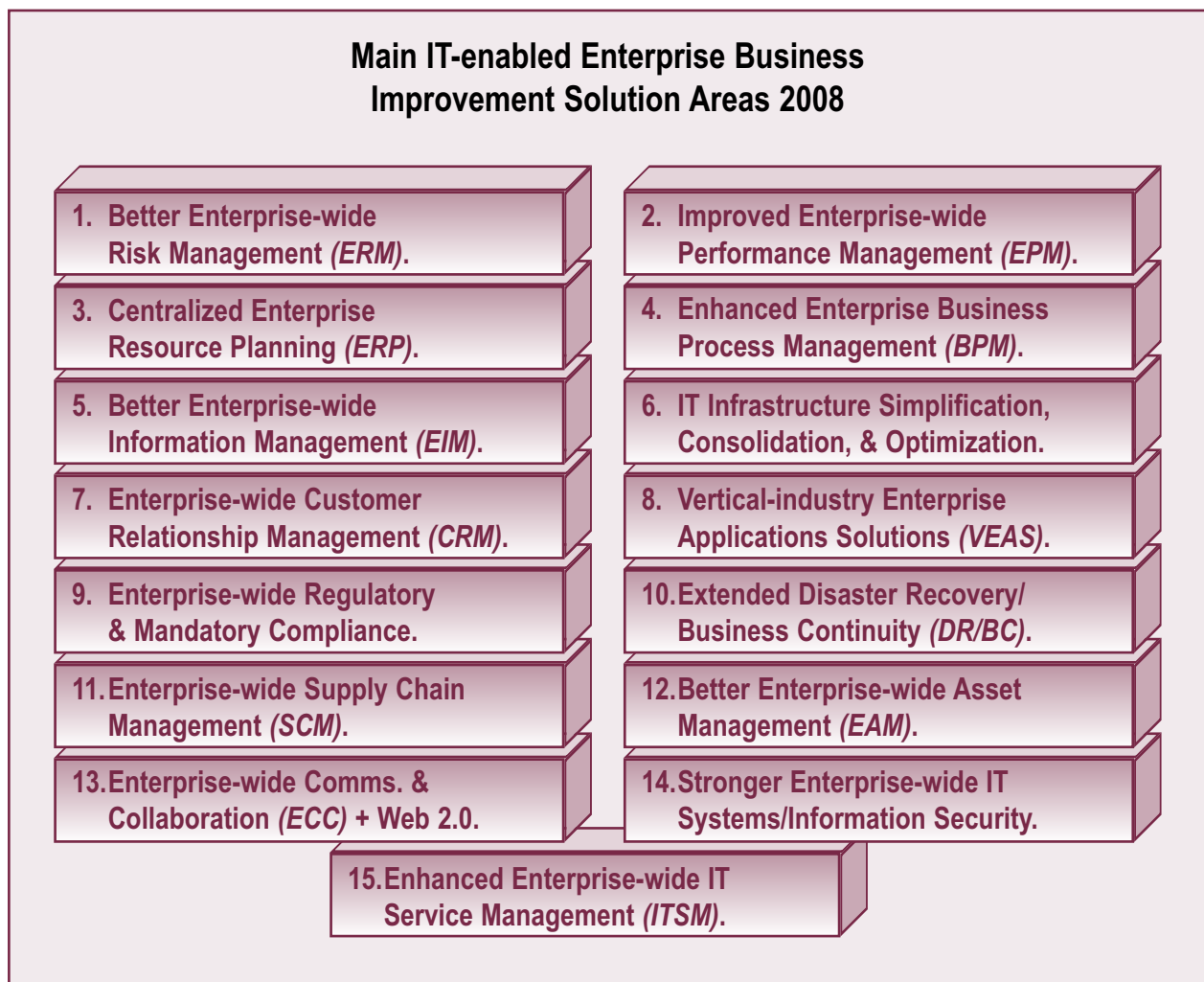
Main IT-enabled Enterprise Business Improvement Solution Areas 2008

1. **Better Enterprise-wide Risk Management *(ERM)*.**

2. **Improved Enterprise-wide Performance Management *(EPM)*.**

3. **Centralized Enterprise Resource Planning *(ERP)*.**

4. **Enhanced Enterprise Business Process Management *(BPM)*.**

5. **Better Enterprise-wide Information Management *(EIM)*.**

6. **IT Infrastructure Simplification, Consolidation, & Optimization.**

7. **Enterprise-wide Customer Relationship Management *(CRM)*.**

8. **Vertical-industry Enterprise Applications Solutions *(VEAS)*.**

9. **Enterprise-wide Regulatory & Mandatory Compliance.**

10. **Extended Disaster Recovery/ Business Continuity *(DR/BC)*.**

11. **Enterprise-wide Supply Chain Management *(SCM)*.**

12. **Better Enterprise-wide Asset Management *(EAM)*.**

13. **Enterprise-wide Comms. & Collaboration *(ECC)* + Web 2.0.**

14. **Stronger Enterprise-wide IT Systems/Information Security.**

15. **Enhanced Enterprise-wide IT Service Management *(ITSM)*.**

Figure 1: Main IT-enabled Enterprise Business Improvement Solution Areas – Mid-2008

2. Back on Top – IBM Mainframe Again Leads Enterprise Computing Today

Strong System z Growth, Renewed Respect in 2000 Decade

IBM's System z mainframe deservedly enjoyed a big resurgence with a complete market revaluation this decade. IBM has completely transformed the mainframe by many billions of dollars worth of hardware/software investments since 1993. Since 2000, medium-larger enterprises using mainframes greatly expanded capacity, and/or installed additional systems, as they deployed many new workloads *(see next subsection)*, whilst most saw traditional workloads grow too.

Global IBM mainframe-installed capacity rocketed over 6-fold from 1997 to top 12 million Millions of Instructions Per Second *(MIPS – the most common metric of IBM mainframe capacity)* at end-2007; a striking 20% Compound Annual Growth Rate *(CAGR)*.

IBM also won new mainframe customers around the globe again this decade. These included new enterprises, new M&A combinations, and new public sector entities in Western markets. More striking were the large new System z customer wins in emerging high-growth markets; e.g. BRIC and similar countries. These big enterprises invested in new System z mainframes as the heart of world-class, new enterprise IT infrastructures to run their mushrooming businesses. This added many major new names to a healthier, vibrant mainframe customer base.

New Workloads Drove Sharp Mainframe Capacity Growth

Nearly 70% of the high capacity growth mentioned above was deployed for new-to-mainframe workloads since 2000. These new workloads, each still growing strongly, were:

● Running **Linux applications** on System z.

● **Mass distributed server consolidation** to System z with z Linux.

● Hosting **new-generation Java Platform, Enterprise Edition** *(Java EE)* **enterprise Web applications**, now with added Web 2.0-style capability, under SOA*.

● **Enterprise-wide data serving** for multi-tiered application solutions *(with flagship IBM DB2 & IMS System z databases)*.

● **Modernizing and integrating mainframe applications for the Web**, now under SOA*.

● Deploying **major new enterprise applications packages** *(e.g. SAP, Oracle, and vertical)* more centrally/efficiently.

*SOA = Service Oriented Architecture – discussed in Section 3, sub-section A, on page 7.

Extensive IBM mainframe hardware, economics, operating systems, middleware software, and tool developments enabled these newer workloads to run well, and so to sharply expand capacity usage, on System z.

New System z10 Mainframe – the "Jewel in IBM's Crown"

The most impressive advances were the new **System z10 EC** generation and **four important IBM System z software domains**, all debuting during 1H 2008.

The IBM System z10 EC, by independent evaluation from leading IT system analysts *(including ourselves)*, now stands well above other enterprise server platforms for processing large-scale, centralized, mixed commercial computing workloads, both new and traditional. This vital role demands highly-optimized, intense transaction processing applications and data-serving capabilities, and needs extreme Qualities of Service *(QoS)*.

The System z10 EC is the "jewel in the crown" of IBM's enterprise systems and software strategy.

The System z10 EC is the cornerstone of IBM's **New Enterprise Data Centre** strategic vision for enterprise computing, announced concurrently, and is the "jewel in the crown" of IBM's enterprise systems and software strategy. The New Enterprise Data Center provides IBM customers with a roadmap to achieve more efficient, dynamic business computing, with the System z10 EC as its cornerstone. It starts with infrastructure simplification, then deploys virtualization, management, and automation end-to-end over the entire server, storage, and networking infrastructure, making it respond more dynamically to changing business needs.

System z10 Delivers Major Mainframe Performance Boost

IBM mainframes were long optimized *(by IBM design)* to offer unrivalled data and I/O throughput, transaction response, and batch processing, performance levels. They were also engineered for extreme reliability, availability, and security, and for high ultilization/efficiency, with superior service qualities and manageability. Meanwhile, since the mid 1990s, other system/MPU architectures focused just on raw processor performance and chip clock speeds, often termed "throughput computing". Whilst these far less sophisticated systems lacked the above mainframe QoS, the best offered high "raw bang-for-the-buck" processor performance in a "good-enough" system platform.

Much important new enterprise applications/middleware software was written for, and widely deployed on, large throughput design-focus systems *(then mainly UNIX)* from around 1997-on. Early segment leader Sun lost its lead to HP, and then both were overtaken by IBM, the UNIX market-share leader since 2005.

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

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

Stunning z10 MPU Performance:
Quad-core, 4.4 GHz. -2.56X*,
3 MB L2/core, 991M transistors,
on-chip cryptographic, data
compression,
Decimal Floating Point -X10*,
182 GB/s chip bandwidth,
Close POWER 6 sibling.

Great Processor Flexibility:
<77 total Processor Units (PUs), <64
General Purpose Processors (CP) 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%.

**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.

**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,
HiperDespatch*.

**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 6 GBps InfiniBand I/0 interconnects*
X2.2 *, 6 GBps InfiniBand Coupling Links.

* = Comparisons with z9 EC S54   IFL, ICF, zIIP, zAAP = Specialty System z workload processors
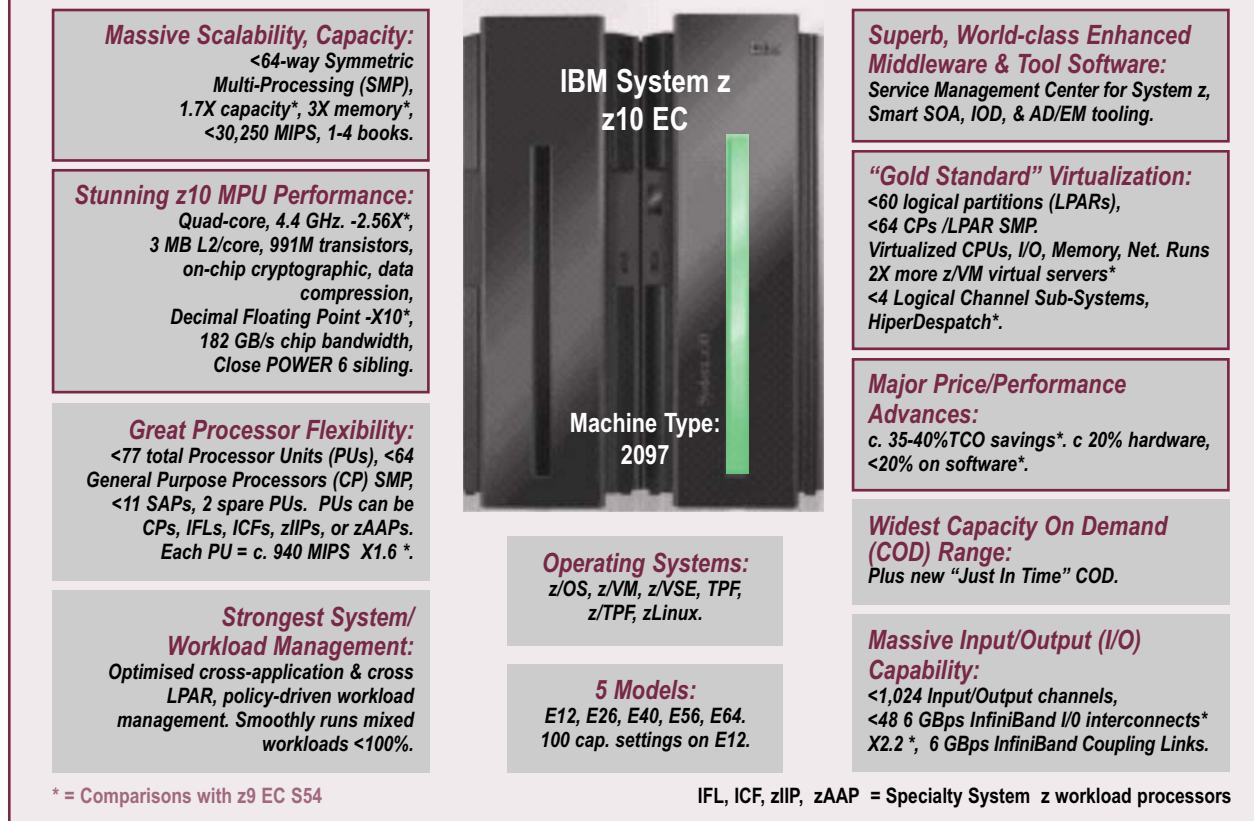
Figure 2: IBM System z10 Enterprise Class High-end Mainframe Storms in – Stunning Advances

IBM's POWER-processor-based System p servers consistently dominated UNIX performance, and price/performance, benchmark rankings, far outdistancing all competitors since 2001. The current POWER6-microprocessor-based System p continued this winning IBM UNIX tradition from mid-2007. Today, most other UNIX server architectures are now dead or struggling.

But 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.

With the System z10 mainframe, IBM has made unprecedented advances in the z10's quad-core microprocessor *(MPU)* and system architecture, delivering the largest-ever jump in processor performance for any new mainframe generation. The new System z10 EC now blends exceptional processor performance gains from the 4.4GHz. z10 chip, with the 1.7X overall capacity hike, 3X times the memory supported, and a 2.2X I/O throughput increase. As a result, the new System z10 EC can now deliver outstanding performance on the increasingly common, processor-intensive commercial workloads, as well as its long established I/O and data intensive workload fortes. 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.

The box headings in Figure 2 summarize System z10 EC highlights simply *(with more detail below the highlights for mainframe-familiar readers)*. We call out the **extreme scalability/capacity, exceptional quad-core MPU-based performance, enhanced world-class middleware and tools software, "Gold Standard" virtualization**, and the **35% price/performance gains**, as five notable z10 advances.

The z10 EC thus allows enterprises to sharply reduce costs, reduce energy use, and slash complexity in their data centers...

The z10 EC provides more than 70% more capacity, over 100% more performance, and has 35% better price/performance, than its z9 EC predecessors. It runs smoothly at near-100% utilization, and uses more than 20% less energy than competing platforms. The z10 EC thus allows enterprises to sharply reduce costs, reduce energy use, and slash 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)*. We found the z10 EC to be an IBM innovation, technology, and MPU, tour-de-force.

New System z10 Mainframes & New Software – $3.5 billion Direct IBM Investment

IBM invested heavily to deliver this new mainframe generation, and four important mainframe software domains *(see Section 3 for more details)*. The new System z10 took an IBM hardware investment of $1.5 billion, using 5,000 IBM staff *(50% more than for the z9 generation)*, plus a direct software investment of $2B using 7,000 IBM staff. Combined, these direct System z-specific investments alone were $3.5 billion, using 12,000 IBM staff for up to five years. These heavy mainframe investments show IBM's unwavering commitment to its again-leadership flagship system.

IBM's strategic new software domains themselves were built-out in massive, five-year, IBM Software Group, cross-platform programs of a near-$25 billion investment. This included IBM's integration of over 45 Independent Software Vendor *(ISV)* acquisitions, and extensive internal domain Research and Development *(R&D)* by several tens of thousands of IBM Software developers.

Significant ISV acquisitions for mainframe users included: Rational Software; Candle Corporation; CIMS Labs, Inc.; Micromuse, Inc.; Consul Risk Management, Inc.; Isogon Corporation; MRO Corporation; and the largest of them all, 2008's $5 billion purchase of Business Intelligence/Enterprise Performance Management *(BI/EPM)* leader Cognos.

Our Analysis – System z10 Offers Escape From Distributed Computing Nightmares

After 1995, scale-out distributed computing *(UNIX & Windows/Intel)* became fashionable, later dominating server unit sales. Death for mainframes was forecast, and distributed vendors loudly attacked, touting wildly unjustified claims for their systems' capabilities and economics. Such false claims persist today.

Live servers deployed worldwide soared from 6 million in 1996, to 32 million at end-2007. Far from reducing IT costs *(as their vendors promised)*, this distributed server explosion drove global IT operations power & cooling costs, up by nearly fourfold *(to c. $140 billion per annum (p.a.) by 2007)*. Legacy scale-out distributed infrastructures proved unmitigated economic, manageability, and environmental disasters. Larger enterprises often deployed over 10,000 such servers. Their huge staffing needs, vast software costs, expensive networking gear and links, plus a usual 5-10% hardware utilization, meant that their real Total Cost of Ownership *(TCO)* was sky-high. These sprawls also were also hugely power hungry to run and cool, and devoured vast areas of costly data center space. Meanwhile, mainframe capacity soared, whilst hardware and software costs fell sharply. Open standards support, plus common middleware/tools software, fully opened up the System z for many similar new workloads, enhancing traditional strengths.

Enterprises are now rapidly consolidating, simplifying, and virtualizing their IT infrastructures. Many are replacing costly legacy scale-out distributed sprawls. A great solution *(for typically 35-50% of distributed workloads)* is to consolidate hundreds of suitable distributed workloads onto a System z, Linux-only mainframe using the z/VM hypervisor. With this legendary software *(extreme virtualization hypervisor)*, one top-end z10 EC can easily run more than 1,000 beefy virtual servers, each hosting one distributed server's workload, but using just a small fraction of the staff, software licenses, space, power, and cost. Huge savings, running up to a staggering $400 million *(IBM's own Project Big Green, including a 3,900 distributed server consolidation onto about 30 System z9 Linux mainframes – as first announced on August 1st 2007 and in progress)* have been achieved with such consolidations. *(See our in-depth White Paper on this topic – see page 20, item 4 for more information.)*

Top-end IBM mainframe capacity soared massively. The largest S/390 G1 mainframe *(1994)* delivered 66 MIPS, whilst 2008's top-end z10 EC can now deliver 30,250 MIPS, 458-times more capacity and a CAGR of nearly 70.0% p.a. Mainframe hardware costs plummeted in parallel. In 1994, S/390 G1 hardware cost over $19,000/MIPS; today's z10 EC costs barely $1,000/MIPS, a 19-fold reduction, sustaining a -20.0% CAGR since then. IBM also delivered similar, sustained cost reductions in mainframe software costs since 1997.

This is an extraordinarily efficient platform, unrivalled in the industry.

Today's z10 EC delivers this huge capacity from its up-to 64 super-high-powered processor cores, and provides formidable virtualization support for up to 60 logical partitions *(LPARs)*, and/or more than 1,000 substantial Linux on z/VM virtual servers, on each system. Each can now host many different workloads, hundreds of applications, and tens of thousands of users simultaneously, with unequalled QoS levels, with far lowest electrical power/cooling, and at the lowest TCO per user and per workload. This is an extraordinarily efficient platform, unrivalled in the industry.

3. IBM's System z Software – Big 1H 2008 Advances in Four Strategic Domains

Dramatic 2008 IBM Mainframe Software Advances

The nine months to mid-2008 saw IBM deliver compelling System z software advances, with four genuinely industry-leading software domains rolled out for its flagship enterprise platform. Their arrival was well-timed to complement the powerful, new-generation System z10 EC hardware, and big blue's New Enterprise Data Center strategy. Our research assessed these together as IBM's most strategically-important platform software advance in the 45 year-mainframe timeline.

The Four New 2008 System z Software Domains

The four IBM System z software domains posting these major advances were announced in 1H 2008, and are named and positioned, with some of their links indicated, in Figure 3 below.

Each of these four System z software domains are explained, illustrated, and assessed below:

A. Smart SOA Adds Process Integrity, Enhanced Business Process Management (BPM) on System z:

SOA is Hugely Important: We rank SOA as the most radical, important advance in business application software architecture in commercial IT's more than 50-year history. SOA is fast becoming the universal way that modern enterprise applications are built, deployed, integrated, managed, governed, and secured. The business and IT benefits of SOA, exploiting open industry standards, are compelling. Current high enterprise IT users' SOA adoption rates will continue for the next five years *(or more)*, we assess.

IBM's Smart SOA for System z Debut: From the Fourth Quarter *(Q4)* of 2007 to Q2 2008, IBM launched this third wave of new/enhanced software, further strengthening its already market-dominating SOA portfolio, especially for the System z. Over 1,500 System z customers had adopted IBM SOA software on the platform *(first offered from 2005)* by April 2008. These customers now use System z-hosted SOA composite applications to support improved business processes.

System z – Central Role in Enterprise SOA: SOA on System z offers highest business value because users can exploit their wealth of mainframe applications, transactions, and databases. With 15,000 mainframes, at 10,000 leading enterprises in use today, these assets are immense – as per the left side of Figure 4 *(on page 7)*. The right side of Figure 4 shows how Smart SOA complements unique mainframe strengths. It enables new composite applications to be rapidly created that support transformed business processes, assembled from both newly-built software and existing host software components. Highly-virtualized, energy-efficient, System z10s easily host scores of composite SOA applications each, all communicating "inside-the-box" at wire speed. Each z10 can support thousands of users, all accessing large-scale mainframe DB2 or IMS databases and proven transactions, at highest levels of efficiency, with complete reliability and security, and at the lowest TCO.
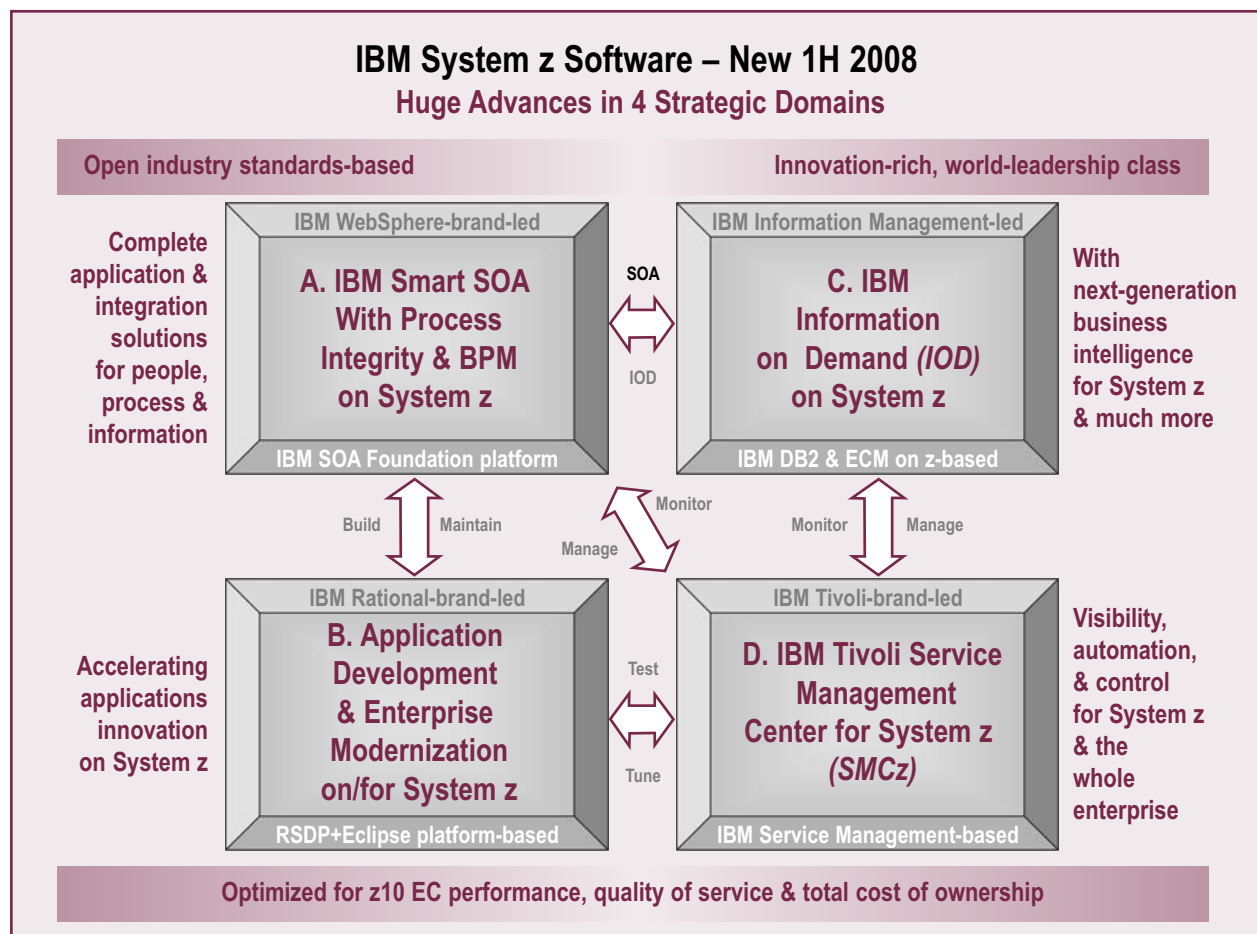

Figure 3: IBM System z Software New in 1H 2008 – Huge Advances in 4 Strategic Domains

Smart SOA – Creating New Value From System z Assets
New System z Application Solutions

System z Mainframe

Stores 70% of corporate data

Host estimated $3 Trillion in core assets

Estimated z applications replacement costs $20 Trillion

CICS handles transactions valued at over $1 Trillion/week

IMS handles over 50 Billion Transactions/day

Source: IBM 2008

Build SOA Round Core z Applications
Most highly virtualized & energy efficient:
  – Driving out cost and complexity
Strongest security & resiliency:
  – Minimizes risks & downtime
Centralized enterprise data serving & IOD:
  – Great business analytics platform
Strongest foundation for enterprise SOA:
  – IT that responds to the business
A now-flourishing mainframe ecosystem:
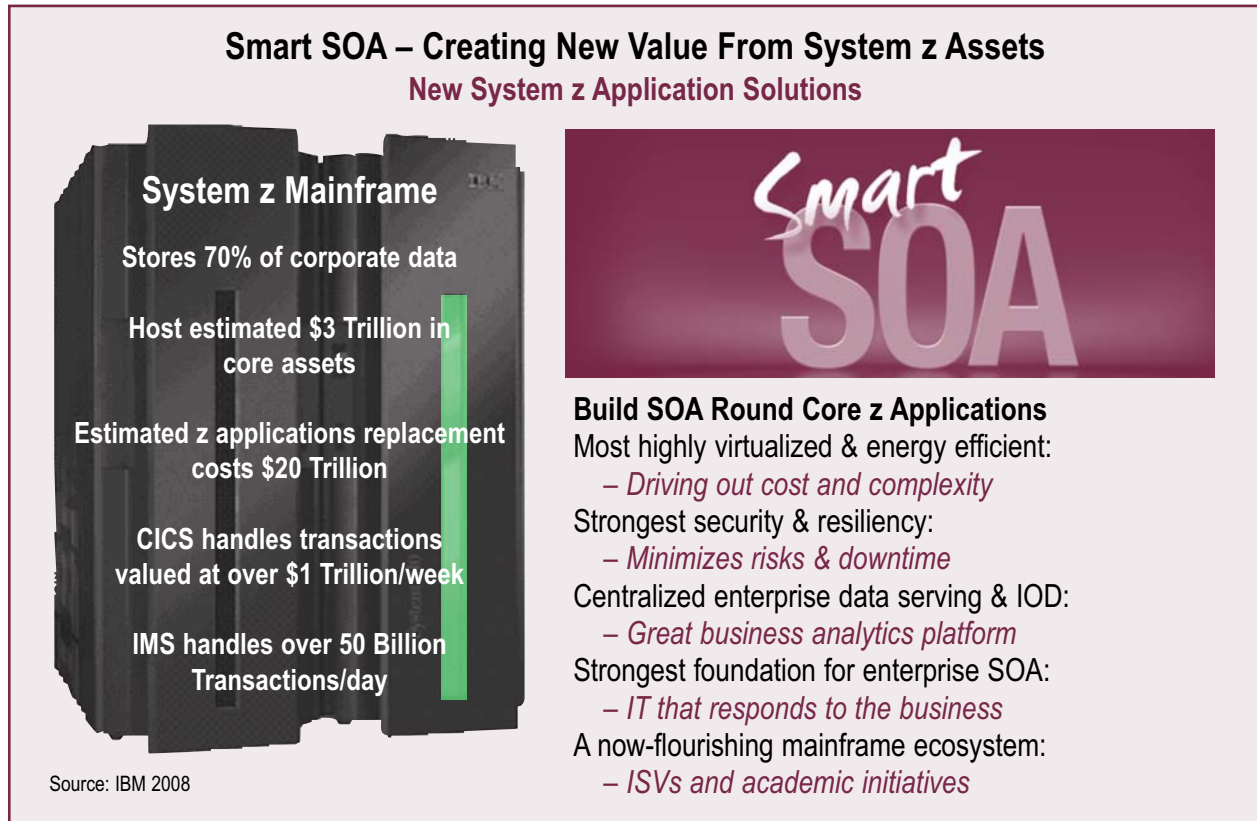 *– ISVs and academic initiatives*

Figure 4: Smart SOA – Creating New Value from System z Assets – New System z Application Solutions

Smart SOA Architecture, Advances: Smart SOA extended rigorous Process Integrity, and added advanced BPM support. Process Integrity is a unique IBM SOA differentiator, enabling reliable business activity to be run on the totally secure, high-QoS, scalable System z SOA platform, with seamless synchronization between services, human tasks, information, domains, and users. Process Integrity includes:

- **Transaction Integrity:** Supporting real-world mixes of both regular atomic and long-running transactions, with consistent business process execution, automated recovery, and enterprise-grade scalability. The underlying transaction processing strengths of System z and its subsystems were much extended in Smart SOA software to deliver this.

- **Information Integrity:** Delivering reliable, trustworthy, complete and accurate, in-context, secure, and manageable information to all of the enterprise's SOA applications. Enterprise information integrity is delivered by IBM's advanced, new IOD capabilities, highly supportive of Smart SOA. *(See sub-section C below.)*

- **Interaction Integrity:** Ensures that people interactions with SOA-based business processes are of high integrity and scalability, when and wherever done. Includes providing role-based tasks, customized views/access, flexible integration, suitable interfaces for each type of user, and identity management support.

These advanced Process Integrity attributes, plus the high QoS and tight security of System z mainframes running IBM's Smart SOA WebSphere software, now clearly provides a comprehensive "SOA central" host/hub for enterprise SOA composite applications. The Smart SOA Process Integrity graphical icon, and the main available System z Smart SOA and IOD products, are listed in Figure B1 in Appendix B on page 18.

Analyst Assessment – Smart SOA on System z Extends IBM's Dominant SOA Leadership: Today's System z10, combined with IBM's comprehensive, industry-leading Smart SOA software, now offers a leadership enterprise SOA hosting environment. Helping enterprises accelerate real business change and innovation to gain clear competitive differentiation through SOA, is IBM's business-value-focused, top-level SOA message. With a 64% market shares *(by number of customer engagements, and by 2007-software market share)* IBM's dominant industry thought and market leadership in SOA is clearly apparent. Smart SOA strengthens this commanding position. IBM's lead results from its 5-year, cross-company, multi-billion-dollar effort that produced the unrivalled SOA software portfolio it offers today. IBM also offers extensive vertical industry SOA frameworks/solution content, numerous SOA accelerators & assets, and vast SOA services capabilities, based on deep, real-world experience from the 6,550 IBM customer engagements joined *(to April 2008)*.

On System z, IBM completely re-engineered its whole mainframe middleware stack to fully support today's wide spectrum of SOA open industry standards, integrated this stack tightly with core System z capabilities, and added the modern development tooling needed.

B. Application Development *(AD)* and Enterprise Modernization *(EM)* Tooling for System z

IBM Rational System z AD/EM Tooling: Back in 1999, IBM's AD tooling portfolio for its S/390 mainframe was frankly threadbare, aged, and far outgunned by ISV offerings. In 1H 2008, IBM Rational completed a transformation of System z's AD/EM tooling portfolio. The advances completed a now-extensive, modern, world-class and Smart SOA-supportive, Rational Software Development Platform *(RSDP)*-based, AD/EM tool portfolio for System z. This is now a real asset to, and advantage for, the System z platform. The portfolio now supports development of all types of applications, including traditional CICS, IMS and batch, as well as modern SOA composite, integration, BPM-based, and/or Web 2.0 applications styles. Traditional mainframe programming languages and skills like COBOL, PL/1, and Assembler, as well as modern C/C++ and Java EE languages/skills, are extensively supported in cohesive Integrated Development Environment *(IDE)* for System z facilities.

IBM Rational System z AD/EM Tooling Architecture and Products: Figure 5 provides our compact, one-chart summary of the broad functional coverage, primary capabilities *(left side)* and the main new/enhanced, mainly IBM Rational, AD/EM products now offered for System z development. Today, these support the whole Smart SOA applications continuum, from the most basic to the most advanced *(as shown center left)*, and address:

- **Extending the value of existing mainframe software assets** for reuse in new SOA composite applications.
- **Enabling System z users to take fullest advantage of all available skills**, with a highly-productive IDE supporting existing mainframe-skilled developers, whilst also enabling staff with only-newer AD skills to also be productive in mainframe development.
- **Brings new tooling innovation, and new application styles**, to the mainframe, including SOA integration, BPM-based, and Web 2.0 mashup applications and tool styles, complementing traditional transactional strengths.
- **Enabling greater business flexibility and ease-of-change**, by simplifying rapid application change throughout the software lifecycle.
- **Improved development team collaboration and responsiveness**, from advanced team development support facilities.

Figure 5: Application Development & Enterprise Modernization Tooling for Smart SOA on System z

This open standard Eclipse-platform-based RSDP tooling now supports building, testing, and maintaining of new SOA, and modernizing/extending existing, mainframe applications. The portfolio supports all System z programming languages and all developer skill-types *(including those typically found in younger staff)*. It also supports the building of SOA- and BPM-based applications, and of latest-generation, Web 2.0-style software under an SOA. Extensive RSDP software lifecycle, team development, testing, and application development process management support, are now also offered to System z users for the first time. These major IBM Rational System z portfolio advances complement/support IBM's Smart SOA run-time software discussed in sub-section A above. The right side of Figure 5 provides short introductions to the main products offered.

...these offerings now provide more modern, more advanced, and more tightly-integrated AD/EM facilities for System z than the tooling available for other hardware platforms – a big step forward.

Analyst Assessment – Rational System z SOA AD/EM Tooling Jumps Ahead: IBM delivered striking advances to complete this now extensive and modern, Smart-SOA-supportive, AD/EM tooling portfolio for System z. This caters for all application styles *(including traditional third-generation language-based, new SOA, BPM-based, and Web 2.0 styles)*, all languages *(new and traditional)*, and for diverse developer skills. Being Eclipse-based, these tools provide a superior IDE, tightly coupled to, and well integrated with, the whole System z software environment. Extensive RSDP-based team-development support is also now provided for System z users. In our assessment, these offerings now provide more modern, more advanced, and more tightly-integrated AD/EM facilities for System z than the tooling available for other hardware platforms – a big step forward.

C. Information on Demand on System z

Introducing Information on Demand: IOD is IBM's ambitious, two-year-old strategy that delivered an innovative new generation of IBM Information Management *(IM)* software, solutions, and services. IOD enables global enterprises to rapidly **deliver trusted, reliable, accurate, consistent, and current information**, as-and-when-needed *(both structured data and unstructured content)* to applications, business processes, and people, throughout the company.

The term "IOD" well reflects today's diverse, demanding, and dynamic real-time, information needs. These can now only be met by automatically delivering "Information as a Service" on-demand and enterprise-wide, with stringent QoS and security levels *(rather than via the scores of piecemeal, historical approaches most firms still use today)*.

IOD complements SOA, the two closely linked by open standards, feeding vital information into SOA composite applications. IOD is the strategy of IBM's successful IM brand software unit, home of its famed DB2, IMS, & Informix database, content management, and database tools, software. Introduced in February 2006 *(after three intensive years' prior R&D)*, IOD is a comprehensive vision that now greatly extends IBM's IM stronghold.
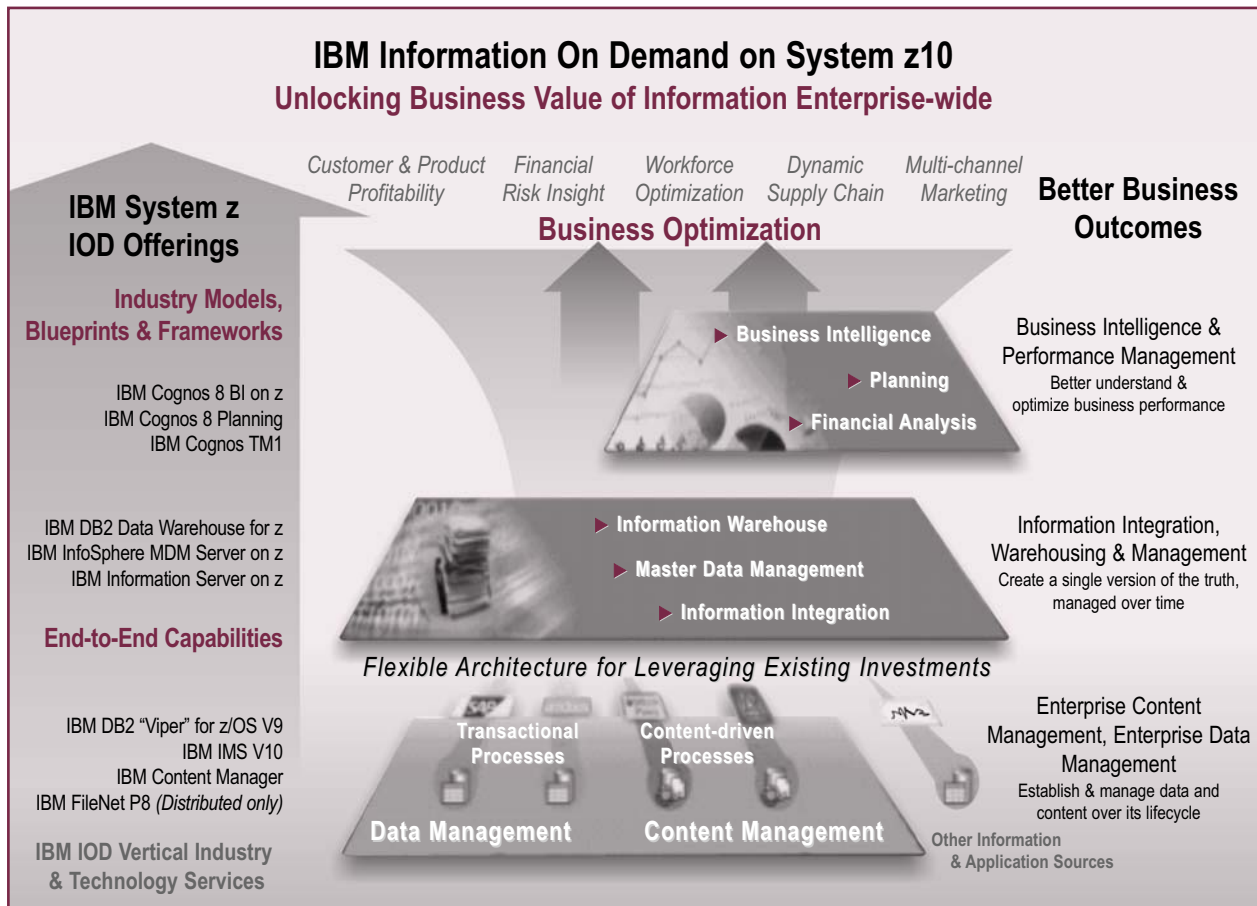
IBM completed *(most of)* the IOD for System z portfolio with the additions announced in 1H 2008. The giant had made over 25 significant ISV acquisitions, and invested over \$15B *(our estimate)* in IOD so far; a major effort, even for IBM. In just over two years it successfully delivered an innovative range of advanced IOD software, solutions, and services, and won a now-mushrooming IOD customer set amongst IBM's many-thousands-strong IM enterprise user base.

Complete System z IOD Solution Stack Now Available: New IOD software now enables System z mainframes to efficiently serve as an enterprise-wide "IOD central" hub. This role brings mainframe-based, real-time data warehousing and world-class business BI/EPM with new IBM Cognos 8 offerings. IOD's foundations are long-established IBM IM software brand-group System z "crown jewels", DB2 for z/OS *(V9.0)*, IMS *(V10)*, and System z ECM offerings. IOD adds sophisticated, new host-based information integration, information transformation, cleansing and loading, plus metadata, capabilities that support the creation of dynamic data warehouses *(on System z DB2)*. It also added innovative new unified enterprise master data management, plus the IBM Cognos 8 capabilities discussed above, all running on the cost-effective zLinux on System z platform. IBM is now rebranding IOD products with its new "InfoSphere" brand-word on all new releases. A new, unified data development tool *(IBM Data Studio)* was also introduced, complementing the IOD runtime servers.

IOD on System Architecture, Scope, and Products: The architecture of IOD on System z, with the layers, functions, end-goals, and main enabling software products, are shown in Figure 6 on page 11, which reflects our descriptions mentioned above. The three architecture layers of IOD are shown in the center, each described in text on the right, with the associated, System z IOD-enabling products listed on the left.

The base layer, of high-performance data management and content management, are long-established System z strengths, augmented by recent big advances in DB2 *(eXtensible Markup Language (XML) support, dynamic data warehousing, and the System z Integrated Information Processor (zIIP) database specialty processor, etc.)*. These feed data into the new IOD middle layer, where the new IBM Information Server delivers integration, cleansing, transformation, aggregation, and information loading into data warehouses *(on DB2)*.

IBM Information On Demand on System z10
Unlocking Business Value of Information Enterprise-wide

Customer & Product Profitability · Financial Risk Insight · Workforce Optimization · Dynamic Supply Chain · Multi-channel Marketing

Better Business Outcomes

IBM System z IOD Offerings

Business Optimization

Industry Models, Blueprints & Frameworks

IBM Cognos 8 BI on z
IBM Cognos 8 Planning
IBM Cognos TM1

▶ Business Intelligence
▶ Planning
▶ Financial Analysis

Business Intelligence & Performance Management
Better understand & optimize business performance

IBM DB2 Data Warehouse for z
IBM InfoSphere MDM Server on z
IBM Information Server on z

▶ Information Warehouse
▶ Master Data Management
▶ Information Integration

Information Integration, Warehousing & Management
Create a single version of the truth, managed over time

End-to-End Capabilities

Flexible Architecture for Leveraging Existing Investments

IBM DB2 "Viper" for z/OS V9
IBM IMS V10
IBM Content Manager
IBM FileNet P8 *(Distributed only)*

Transactional Processes · Content-driven Processes

Data Management · **Content Management**

Other Information & Application Sources

Enterprise Content Management, Enterprise Data Management
Establish & manage data and content over its lifecycle

IBM IOD Vertical Industry & Technology Services

Figure 6: IBM Information on Demand on System z10 – Unlocking Business Value of Information Enterprise-wide

The new IBM InfoSphere Master Data Management Server provides enterprise-wide unified master data management for customers and products, etc. Also new, the IOD top layer provides powerful BI/EPM analysis and reporting with the leadership IBM Cognos 8 offering that is now fully integrated into the IOD portfolio. *(Cognos was IBM's largest-ever acquisition at $5 billion and closed in February 2008)*. All these new IOD offerings run on the cost-effective, flexible System z Linux environment.

Executive surveys showed that BI remains a top 2008 priority for CIOs; and EPM a top priority for CFOs. Enterprises now need one central, common, BI/EPM platform, with dynamic, real-time delivery replacing inadequate, piecemeal, old-style, historical BI approaches. IBM's Cognos 8 offering, supported by the IOD portfolio discussed above, best meets this need.

After huge IOD investment and extensive innovations, IBM has leapt ahead of its IM competitors to seize a wide lead in an IOD-redefined market.

On System z, IBM is the only "complete IOD game in town".

Analyst Assessment – System z BI/EPM & Data Warehousing a Winner: IOD for System z is built on the latter's rock-solid, much-extended DB2 data-serving strengths, and enterprise content management capabilities. Now complemented by IOD's unique, new information integration, transformation, and MDM software on System z, these benefit from the superb performance levels, and new economics, of the System z10 EC. This combination will encourage hundreds more customers per year to deploy high-performance, dynamic data warehouse solutions, fully exploiting IOD's class-leading IBM Cognos 8 BI/EPM, and information integration software, running on System z mainframes, we assess. After its substantial IOD investments and innovations, IBM has pulled ahead of its IM competitors *(Oracle, Microsoft, Sybase, Teradata, and Informatica, etc.)* to establish a technology lead in an IOD-redefined IM market. Microsoft lags on IOD, and Oracle seems more focused on its enterprise applications rewrite and SOA middleware line rationalization challenges *(post BEA)*. On System z, IBM is the only "complete IOD game in town".

D. IBM Tivoli Service Management Center for System z *(SMCz)*

Introduction: Newest domain, **IBM Tivoli SMCz** was launched with the z10 EC mainframe in February 2008; these products shipped late-May 2008. With SMCz, enterprises can deploy service management spanning all their IT platforms and operational processes, strategically exploiting their mainframe as the integrated, enterprise-wide hub better managing real business *(and IT)* services end-to-end. SMCz brings powerful **process automation** and **service management**, taking full advantage of the System z10's high power and unique QoS. It includes proven best practice processes from the IT Infrastructure Library *(ITIL)* V3. Innovative new IT financial management capabilities enable IT to accurately account for, and recharge, all IT resource usage, and better manage software licenses and IT contracts, on their mainframe.

SMCz Positioning/Strategy: SMCz now enables automated management of complex IT operations processes using the 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. SMCz combines innovative, new IBM Tivoli-developed software, new software products from several important, recent IBM Tivoli ISV acquisitions, plus enhanced releases of well-proven IBM Tivoli System z operational management tools.

SMCz substantially extends System z operations automation by adding advanced process automation and service management capabilities to processes both on the mainframe itself and the other platforms used.

SMCz thus offers major IT operations efficiency and business services delivery improvements extending service automation and process integration over a much wider set of IT operational assets. It ties IT performance to the main business Key Performance Indicator *(KPI)* goals, reduces IT operating costs, meets tougher security, regulatory, and compliance demands, and improves business-user satisfaction and alignment with IT.

IBM Tivoli SMCz Architecture: The three-layer architecture, scope, and service management functionality of IBM Tivoli SMCz are shown in Figure 7. SMCz runs above the enterprise's "optimized IT infrastructure", improving top-level "business services and best operational practices" as its main goals. The three layers are:

1. **Process Management:** System z-based software products integrating/automating 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.
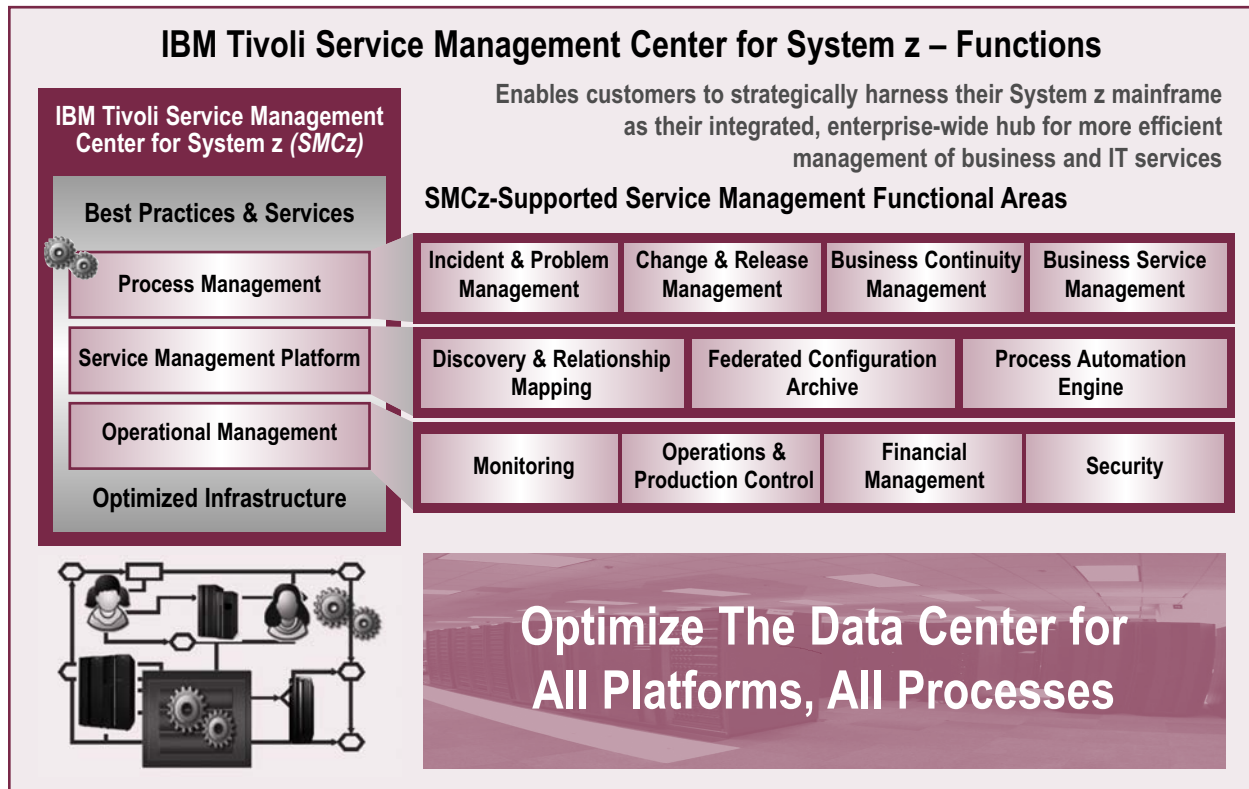
Figure 7: IBM Tivoli Service Management Center for System z – Functional View

2. **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. The SMCz service management platform comprises powerful new **Application Dependency Discovery and Relationship Mapping, Federated Configuration Archive, and Process Automation Engine** capabilities. These help users integrate, automate and optimize data, workflows, and policies, and allow them to better align IT infrastructure management with real business priorities. These tools also integrate and combine data from operational management products *(that are particularly rich on System z.)*

3. **Operational Management:** Systems management software which automates diverse areas of application and business service operational management, including System z-specific IBM Tivoli software for **IT Performance Monitoring and Management, Operations and Production Control, IT Financial Management, and IT Security**. The IT Financial Management capabilities of SMCz are also 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.

The System z SMCz products now available are shown in Figure B2, Appendix B, on page 19, in the same SMCz architecture format as used in Figure 7 *(on page 12)*.

Our Analysis Assessment: We found that SMCz combines well-proven IBM Tivoli operational systems management, monitoring, automation, and security products for System z, with established ITIL best practice processes. It adds integrated System z service management and process automation capability. SMCz now enables the System z mainframe to "service manage" the complete enterprise at the "true-business-service" level, from one central point of management control. SMCz offers **higher-visibility, better-controlled, and more fully-automated management**, of real business services enterprise-wide, whether run on distributed or mainframe platforms, or a mix.

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 brings cost reductions and better financial control of IT operations, software, and contracts.

We found SMCz was a powerful new offering we warmly commend to mainframe CIOs and IT operations executives, for the substantial business service and IT benefits that it offers.

Our assessment showed SMCz to be a leadership enteprise service management solution, taking excellent advantage of System z10 mainframe strengths. We found SMCz was a powerful new offering we warmly commend to mainframe CIOs and IT operations executives, for the substantial business service and IT benefits that it offers.

(Note: For our in-depth assessments of these software domains, see our other 2008 System z Software Papers on page 20.)

4. Analyst Conclusions, User Recommendations

We drew ten conclusions from our in-depth studies of IBM's four System z software domain advances above. From these, our recommendations for enterprise IT users are also drawn, see below:

1. **Enabling Business Transformations Needed:** In today's tougher business climate *(Section 1)*, enterprises must now strive harder to maintain performance, and to raise efficiency wherever possible. They must sell more, spend less, and speed their business processes. Only with such business transformation can firms outperform competitors and hold/gain share through the downturn. Most transformations today are IT-solution-enabled *(see Figure 1, page 3)*. Many such advanced application solutions are now available for System z, from a host of top ISVs, see point 5 below. Section 3's four IBM strategic System z software domain advances strongly support/enable and complement these business-transforming solutions, exploiting unique System z strengths, when run on extended mainframe footprints.

By mid-2008, these advances in all four System z software domains lifted IBM's System z10 software stack to "best-ever" capability.

2. **IBM System z Software Hits "Best-ever" Level:** By mid-2008, these advances in all four System z software domains above, we judged, lifted IBM's System z10 software stack to "best-ever" capability. Sharply extending IBM's continuously high System z software investments of this decade, each of the open SOA, IOD and SMCz middleware, and AD/EM tooling, portfolios is now of clear industry-leadership status *(see point 4 below)*.

Each are underpinned by strong System z operating systems, compilers, management, other tools software, and also embrace extensive open standards, support. Customers can now confidently adopt/exploit these strategic IBM software domain solution-enablers, in small steps if they wish *(see point 3 below)*.

3. **Fast ROI with Incremental Deployments:** Each System z software domain offers enterprise-wide, large-scale capabilities that bring large benefits with full-scale deployment. But domain adopters can start small, at low risk/cost, without "big-bang" transition fears. IBM offers flexible entry points, highest-value scenarios, readiness assessments, free software test sandboxes, and extensive services, all valuable accelerators. We recommend fast-start entries be chosen to solve urgent business pain-points quickly, to gain high ROIs. These starters should next be extended/linked to reap wider benefits. All four domains are complementary, adding synergies when two *(or more)* are combined. *(E.g. SOA is enabled with AD/EM, SOA is extended by IOD, SMCz better manages SOA & IOD, etc.)*

4. **Main Competitors Outdistanced in These SW Domains:** In the operational domain advances – Smart SOA, IOD, and SMCz – IBM sharply extended its leadership. Big Blue now commands strong thought, technology, and market-share, leadership over its main enterprise middleware software competition *(Microsoft, Oracle, SAP, and HP here)*. The AD/EM domain added "best development tooling" on System z to build new SOA solutions and modernize existing mainframe applications. These advances, we found, move IBM 12-18 months ahead of these competitors cross-platform. With the four domain software portfolios optimized for, and now out on, its flagship new System z10 platform, IBM's domain solutions are also the only full-scale choice for mainframe users/new adopters. Enterprises can thus safely adopt these domains, confident each is best on the market, and on System z.

5. **System z Ecosystem's Extensive Applications Solutions:** The ecosystem of System z applications and ISVs grew strongly in recent years and now includes:

   - **Over 4,000 total applications** – up 600 in 2007, a 15% increase in System z applications available.

   - **Over 1,100 Linux applications** – up 260 in 2007, a 23.6% increase in System z Linux applications offered.

   - **From over 1,200 ISVs** – up 67 in 2007, 6% more ISVs, each averaging 3.3 System z applications offered.

   Major System z ISV partner names now include ACI, ASG, Red Hat, Novell, SAS, SAP, Oracle, Information Builders, Beta Systems, BMC, Compuware, CA, Computer Corporation of America, e-Funds, Informatica, Fidelity Information Services, Metavante Banking Solutions, Stonesoft, and Pega. Old competitor-spread myths, that mainframe applications are few, should clearly now be ignored today, as this ecosystem expands.

6. **Mainframe Skills Supply Healthy, Increasing:** IBM's Academic Initiative for System z achieved good success since 2003. Over 400 institutions worldwide taught over 50,000 students mainframe skills to date, their graduates snapped-up fast by System z customers, many now collaborating with local universities. This healthy flow of young faces has augmented System z workforces, with further growth projected. Newer mainframe workloads use newer software skills, such as Java EE, C/C++, and Linux – now each important mainframe skills that are widely, affordably available worldwide. Younger development staff can easily now work on System z developments using these familiar newer technologies. New IBM Rational AD tooling *(Figure 5, on page 9)* now also empowers staff without traditional System z language skills to develop for the platform, widening resource options. Long-standing and highly experienced mainframe development, systems programming, and operating staff, remain highly valued, most in stable and respected teams at major System z sites. Such deeply experienced mainframe expert skills are again in demand under renewed mainframe growth today. In 2007, IBM also pledged $100M+ extra investment over five years to further simplify and modernize mainframe interfaces, to make it still easier and more attractive, to both learn and use, for newer staff: this program continues to deliver significant advances yearly. Rapid customer uptake of the four new System z software domains *(of Section 3)* has already enlisted *(SOA)*, or will rapidly draw *(IOD & SMCz)* many thousands more experienced IT staff *(from other platforms)* to work on implementing these newer and high-interest technologies at enterprise scale on System z. As a result, mainframe skills, in most markets, are again in more plentiful and growing supply.

7. **Distributed Server to System z Consolidation Recommended:** Too much of enterprise IT budgets *(80% +/- average)* is locked up supporting/operating existing systems/applications portfolios. Wasteful, inefficient distributed server IT infrastructures, the worst drivers of such costs, can no longer be tolerated. Their inflexibility prevents quick response to fast business change, also unacceptable today. These server sprawls, with soaring power demands at far higher prices, drove operating and IT energy costs sky-high. Today, economic logic and "Green IT" demands these sprawl costs be cut hard. Data centers overflow and cannot grow, and high staff levels are needed to tend massed servers. We firmly recommend now consolidating 100s to 1000s of suitable distributed *(UNIX & x86/x64)* server workloads onto an *(or a few)* ultra-efficient System z10 mainframe*(s)* running Linux under z/VM. This dramatically compresses the sprawls, claims back whole data centers of space, and saves many $10M to $100M per customer, in mid-larger cases over a 5 year term. The new z10 generation, see point 7 below, further strengthened the already-good ROIs. These substantial savings can then fund other vitally-needed, and business transforming System z solutions above.

Where Enterprises Should Add New System z10 Mainframe(s) – Six Strong Cases	
Case Situation	**Why/How Additional System z10 Mainframes Deliver the Best Solution**
1. To Provide Major, New, World-class, Enterprise IT Infrastructure:	Where main workloads include heavy, mission-critical, high-volume, commercial, on-line transaction processing on large databases, plus heavy batch processing. Must also have high QoS, strong security, and lowest cost per transaction. May be an all-new IT infrastructure, or a replacement for inadequate old systems. Outstanding 2008 strength of the System z10 SOA run-time infrastructure, application development, and IOD, etc., software stacks, are major enablers. May be for large, newly-formed organizations anywhere, for new M&A combinations, or for a large enterprise in an emerging growth market *(e.g. BRIC)* newly-equipping itself. May require multiple z10 systems, in two or more new data centers, for the larger/largest customers. The new applications may be major packages *(see Case 2 below)*, be custom-built using SOA *(see Case 6 below)*, or a mix of these. Case example: A national bank in China. **All four 2008 IBM z Software domains support this Case.**
2. To Deploy Major, New, Enterprise-packaged Applications More Centrally & Efficiently:	To host centralized, enterprise-wide deployment of a major, new-generation, horizontal enterprise applications package *(ERP, CRM, SCM – SAP, Oracle, etc.)* or a major, business-critical, vertical, industry-specific enterprise application package *(e.g. banking, insurance, retail, telecommunications)* for thousands of users. Very large database support, powerful data-serving, plus deep application-serving power, are vital – all now ideally provided by System z10 with DB2 & SOA. Many of the world's top applications, of both these types, are now available on System z. Case examples: A large, new mySAP.com deployment for a retailer, or a global bank's new ACI BASE24 Payments solution. **All four 2008 IBM z Software domains may support this Case.**
3. For Mass Distributed Server Consolidation to z/VM With Big Million Dollar Savings:	To eliminate hundreds to thousands of wasteful, distributed server *(RISC-UNIX and Intel)* sprawl by mass-consolidating their workloads onto virtual Linux servers under the z/VM hypervisor. Huge cost savings can easily justify purchase of new z10, Linux-only dedicated mainframes. A top z10 EC can now consolidate suitable workloads from more than 1,000 substantial, distributed servers, and show savings of up to several $10 million over five years, a fast ROI, and huge "Green IT" gains. Today's rich range of System z Linux software *(IBM & ISV)* has much increased the percentage of distributed workloads *(easily)* moved over: E.g. IBM's Project Big Green – 3,900 distributed servers onto 12 new z10 EC systems – a $400 million saving. **All four 2008 IBM z Software domains – z Linux hosted – support this Case.**
4. Where Top-class, Enterprise-wide DR/BC is Required for Important Core Applications/Data:	Many complex, multi-tiered, distributed platform-based, enterprise application portfolios cannot practically or economically be protected with workable DR/BC, leaving their enterprises vulnerable, and breaching compliance rules. System z10 mainframes, with Parallel Sysplex clusters, advanced Geographically-Dispersed Parallel Sysplex *(GDPS)* solutions, complementary IBM System Storage DS8000 high-end storage arrays, advanced Metro and Global Mirror data replication software, plus numerous other elements, enable System z10 to deliver the best range of well-proven, most-highly-trusted DR/BC capabilities. Where important, large-scale customer or package application workloads and databases must be reliably protected by fully-effective DR/BC facilities, adding System z10 mainframes to host these workloads, and to deliver the needed appropriate DR/BC facilities, is often the best solution.
5. To Power New, Enterprise-wide IOD Hub Role:	Extends System z's long-standing, enterprise-wide, DB2 *(or IMS)* data-serving and content management, hub roles. System z10 EC mainframes especially are now ideal enterprise-wide hubs best able to deliver IBM's full IOD vision. With new IOD software, the platform can now deliver consistent, accurate, "single-source-of-the-truth" information *(both structured and unstructured)* to all the people, processes, and applications that need it enterprise-wide. System z10 IOD now includes enterprise-wide BI/EPM *(Cognos 8 BI/EPM)*, based on dynamic data warehousing *(DB2)*, master data management, information transformation/cleansing, as well as core DB2 data serving, and content management. On System z10 these can all be close-coupled with production/operational applications and databases, for true, real-time, dynamic BI/EPM. Additional System z10 EC mainframes will often be needed to run major new IOD dynamic data warehouses. System z plus IOD software now firmly outranks/outruns other dedicated data warehousing offerings *(e.g. Teradata Corporation and HP Neoview)*, and UNIX/Wintel servers running relational databases and BI/EPM tools software. **New IBM IOD software Domain-driven Case.**
6. Where Large Suites of Major, New–generation, Commercial SOA Applications Need to be Built, Tested, and Best Production-deployed:	IBM's extensive, robust, world-class, System z Smart SOA runtime middleware software, leading-edge Rational SOA and Web 2.0 AD/EM, the outstanding BPM capabilities on the platform, plus the System z10 mainframe itself, make a formidable combination. With their extended process integrity *(for transactions, information, and people interactions)* and immense DB2 data-serving strengths, the System z10 EC is now the definitive host platform for developing, testing, and production deploying major, custom-developed, new-generation, enterprise application portfolios, based on the leading modern Java EE software platform. The aim here is to uniquely differentiate the enterprise with a superior business concept, business model, and applications, probably where no such packaged applications exists. May also be Case 1. Will often be combined with implementing IOD *(see Case 5)*, and perhaps packaged applications *(see Case 2)* also. **New IBM Smart SOA & AD software domain-driven case.**

Figure 8: Where Enterprises Should Add New System z10 Mainframe(s) – Six Strongest Cases

8. **System z10 – Unrivalled Enterprise Server Leader:** 2008's IBM System z10 EC holds the crown as the most advanced, sophisticated, powerful, and efficient enterprise server. System z's success has killed off traditional proprietary competitors. Newer challenges, from large UNIX and Wintel servers, since faded, with other IBM scale-up systems now leading in those segments. No other platform today approaches System z10 EC's extraordinary capabilities, massive scale, high-performance, extreme virtualization, highest utilization, and great openness. Reliability, security, and availability remain legendary, now complemented by the four extensive new IBM software domains, low footprint, low power and cooling needs, low support staff levels, industry-best Disaster Recovery/Business Continuity *(DR/BC)*, and lowest TCO.

9. **Huge System z10 Processor Performance Leap:** System z mainframes were long optimized *(by IBM design)* to offer excellent data and I/O throughput, transaction response, and batch processing, performance levels. Now, with the latest System z10's quad-core, 4.4GHz.microprocessor *(MPU)*, even throughput chip purists will be impressed by the largest-ever processor performance gains these mainframes deliver, and by their healthy price/performance improvements. Compounding these impressive new z10 MPU-driven gains, are the cost-effective z10 specialty processors *(of equally high chip performance)*, new ultra-high bandwidth InfiniBand Input/Output *(I/O)*, and the rich, again extended System z Instruction Set Architecture. The latter puts more major workloads *(that other systems must run in slow software)* onto System z10 chip hardware that can runs them many-fold faster. On the z10 EC, these workloads now included cryptography, data compression, extensive virtualization support, and new Decimal Floating Point *(10x faster "money math")*. These sharp performance gains made the System z10 highly-competitive running the increasingly wide range of modern commercial workloads that demand processor-intensive, as well as data and transaction intensive performance characteristics.

10. **Where to Add New System z10 Mainframes:** With the power and advances of the new generation System z10 EC, combined with IBM's leadership z software stack *(including the four major domains discussed above)* the combination has reached a new pinnacle of power, capability, and value.

As result, we now firmly expect to see two-to-three thousand additional System z10 installations globally over the next three years, half of which will be brand-new-to-mainframe customers. In Figure 8 *(on page 15)*, we pinpointed the six most common situations where adding a new System z10 can now be firmly recommended. For each, we outline the case, and note how the four System z software domains contribute.

Appendix A: 2008 – Main IT-enabled Business Improvement Solutions

Our research identified fifteen, main, IT-enabled enterprise solutions offering big opportunities for business improvement. They were listed in Figure 1 on page 3, and each is briefly described below. These solutions account for most global enterprise IT investment. The new System z10 EC, combined with IBM's four System z software domains, have made mainframes the premier platforms now best able to deliver *(most of)* these.

1. **Better Enterprise-wide Risk Management *(ERM)*:** Quantifying, managing, controlling, and reducing business and financial risks. Especially for banking & financial services, centralized enterprise applications that give a cohesive, unified view of the business and all risks in real-time have become vital for survival. Shortcomings here can quickly prove fatal. *(Aka Society Generale nearly wrecked by just one rogue trader.)*

2. **Better EPM:** Controlling, managing, and reporting enterprise-wide business performance against KPIs in real-time, with high accuracy and from "single-source-of-the-truth" data, is vital today. Only then can enterprises give a reliable, trustworthy view of their enterprise's real performance to internal managers/executives, and to external stakeholders *(shareholders, regulators, markets, partners, and suppliers)*.

3. **Centralized Enterprise Resource Planning *(ERP)*:** Implementing new-generation, leaner and more flexible, more centralized ERP *(horizontal)* applications. Deploying regional, continental, or global consolidated and standardized ERP instances offers better integration, faster closure, lower costs, and higher QoS. Migrating-off legacy, distributed client/server ERP applications onto new Web browser, server-centric, and SOA-enabled ERP applications is a strong trend.

4. **Enhanced Enterprise Business Process Management *(BPM)*:** Drastically improving critical enterprise business processes, enabled and supported by more flexible, composite BPM applications, with better application

integration, are enabled by SOA technology under open standards. Requires advanced business process modeling & monitoring tools, a robust, open-standards-based, SOA runtime infrastructure, and good access to accurate, enterprise-wide information.

5. **Better Enterprise-wide Information Management** *(EIM)*: Delivering more consistent, more accurate, in-context information *(both structured and unstructured)* to all people, processes, and applications across the enterprise. Supports BI/EPM, Dynamic Data Warehousing *(DDW)*, Extraction, Transformation and Loading *(ETL)*, enterprise data-serving, enterprise master data management *(EMDM)* and enterprise-wide content management *(ECM)*. IBM now calls this collectively "Information on Demand".

6. **IT Infrastructure Simplification, Consolidation, & Optimization:** Enterprise IT infrastructures today are overly complex, too diverse, and are too widely scattered to easily manage. They are thus far too costly, too inflexible, too labor-intensive, whilst delivering poor QoS IT services. Huge gains can be achieved with determined infrastructure simplification, consolidation, and optimization, by using virtualization technologies to share the IT resources far better.

7. **Enterprise-wide Customer Relationship Management** *(CRM)*: Providing a unified, coherent, single view and record of all the enterprise's dealings with each customer, enabling the timely delivery of faster, more responsive, and more effective service and support, and achieving higher sales, lower costs, and increased customer satisfaction.

8. **Vertical-industry-specific Enterprise Applications Solutions** *(VEAS)*: Major enterprise application solutions automating/improving core business processes specific to a vertical industry. Examples include banking *(retail banking, commercial banking, payments, and Automated Teller Machine (ATM) networks)*, insurance *(claims processing and policy management)*, telecommunications *(service provisioning, service billing, and service delivery management)*, and utilities *(consumer billing and repairs & servicing)*. Such large, mission-critical, high-volume applications are vastly important to the business performances of companies in these industries; where old legacy systems now need urgent renewal.

9. **Enterprise-wide Regulatory & Mandatory Compliance:** Across many geographies and industries, increased regulation continues to impose extra compliance demands upon enterprises. Most of these ripple directly into additional systems and IT service requirements, including extended data retention, protection of personal data, levels of DR/BC required, and providing accurate risk management, enterprise-wide.

10. **Extended DR/BC:** Terror threats, accidents, and the frequent natural disasters reported, highlight pressing needs for extended DR/BC at many enterprises. Costs of serious IT interruptions to major businesses can be up to

$2.5 million per hour in some industries, and protecting crucial IT infrastructures that the business depends upon is ever more vital. Providing suitable DR/BC is now often also mandated under regulations.

11. **Enterprise-wide Supply Chain Management** *(SCM)*: Across all types of manufacturing, assembly, distribution, retailing, pharmaceutical, automotive, aerospace, and similar sectors, managing and optimizing fast-globalizing, enterprise-wide supply chains is now absolutely crucial for business performance, cost control, delivery performance, and competitiveness. In such sectors, supply chain costs often dominate, and implementing advanced SCM applications that optimize end-to-end supply chains has become a critical success factor.

12. **Better Enterprise-wide Asset Management and Exploitation** *(EAM)*: Managing, tracking, valuing, maintaining, and efficiently using, all the enterprise's assets *(plants, machinery, equipment, transportation equipment, planes, ships, and IT systems, etc.)* is a fast-growing discipline where advanced IT applications offer huge potential improvements. Without EAM, many enterprise assets go astray or are lost, deteriorate through lack of maintenance, and/or are too often poorly utilized.

13. **Enterprise-wide Communications and Collaboration** *(ECC)* **and "Web 2.0":** Helping the people throughout an enterprise to work seamlessly and effectively with each other in global teams, quickly, economically, and without limitation of distance, demands powerful electronic communications *(e-mail)*, collaboration, and knowledge-sharing technologies. Now the "Web 2.0/Enterprise 2.0" technologies of social networking, wikis, mashups, and information feeds, etc., are coming rapidly into widespread use within enterprise IT, to improve ECC.

14. **Stronger, Enterprise-wide IT Security, Systems, and Information Protection:** Headline security breaches and serious data losses have proliferated. Sharply increasing cyber-crime now targets financial gain/fraud via information and identity theft. Attempted electronic thefts of valuable intellectual property by overseas regimes, security services, and/or competitors, were also widely reported. Enterprise IT infrastructures today need higher levels of protection/security to withstand such an attack, yet many sprawling, complex infrastructures remain poorly protected and thus highly vulnerable.

15. **Enhanced Enterprise-wide Service Management** *(ITSM)*: With more crucial business services and processes being transformed, improved, and enabled by IT applications, managing business services better from end-to-end has become mission-critical. Advanced service management, with full-function process automation, using leading IT processes best practices *(such as those of ITIL)* brings big benefits to IT operations, and greatly improves business-IT alignment.

Appendix B: New Smart SOA & SMCz Product Listings

Smart SOA & IOD Products

The mid-2008 Smart SOA *(and IOD)* products available on System z are listed in Figure B1 below, which also shows the "Smart SOA Process Integrity" icon at its center.

This extensive Smart SOA on System z run-time software is well-supported by the tightly-coupled, powerful, new, IBM Rational application development and enterprise modernization tooling for System z software domain *(discussed in Section 3, sub-section B, on page 9)*.

SMCz Products

Figure B2 on page 19 shows a products view of SMCz, naming the main IBM Tivoli products for System z that deliver each of the SMCz functions previously shown in the similar-format, Figure 7 functional view on page 12.
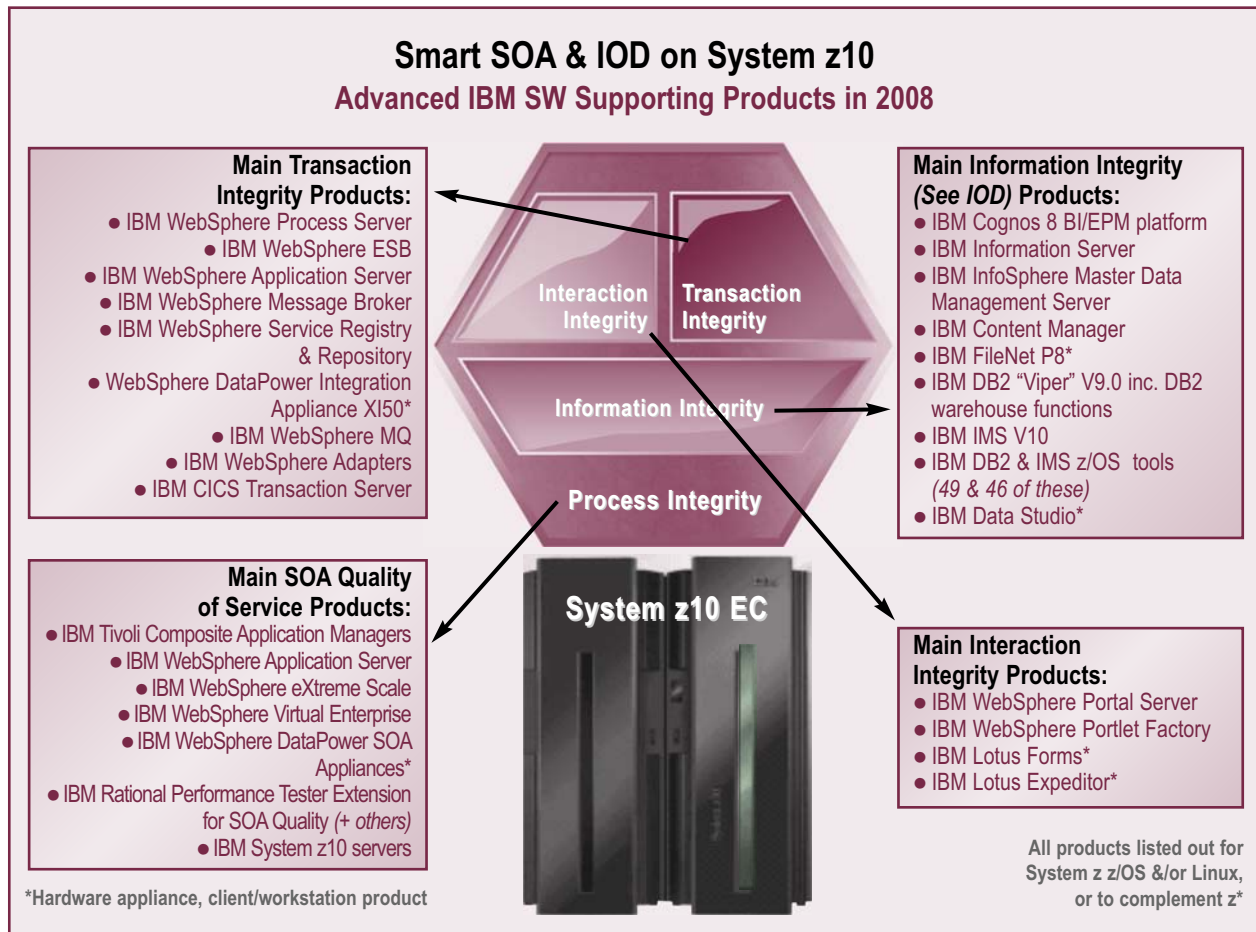
Smart SOA & IOD on System z10
Advanced IBM SW Supporting Products in 2008

Main Transaction Integrity Products:
- IBM WebSphere Process Server
- IBM WebSphere ESB
- IBM WebSphere Application Server
- IBM WebSphere Message Broker
- IBM WebSphere Service Registry & Repository
- WebSphere DataPower Integration Appliance XI50*
- IBM WebSphere MQ
- IBM WebSphere Adapters
- IBM CICS Transaction Server

Interaction Integrity

Transaction Integrity

Information Integrity

Process Integrity

Main Information Integrity *(See IOD)* Products:
- IBM Cognos 8 BI/EPM platform
- IBM Information Server
- IBM InfoSphere Master Data Management Server
- IBM Content Manager
- IBM FileNet P8*
- IBM DB2 "Viper" V9.0 inc. DB2 warehouse functions
- IBM IMS V10
- IBM DB2 & IMS z/OS tools *(49 & 46 of these)*
- IBM Data Studio*

Main SOA Quality of Service Products:
- IBM Tivoli Composite Application Managers
- IBM WebSphere Application Server
- IBM WebSphere eXtreme Scale
- IBM WebSphere Virtual Enterprise
- IBM WebSphere DataPower SOA Appliances*
- IBM Rational Performance Tester Extension for SOA Quality *(+ others)*
- IBM System z10 servers

System z10 EC

Main Interaction Integrity Products:
- IBM WebSphere Portal Server
- IBM WebSphere Portlet Factory
- IBM Lotus Forms*
- IBM Lotus Expeditor*

All products listed out for System z z/OS &/or Linux, or to complement z*

*Hardware appliance, client/workstation product

Figure B1: Smart SOA on System z10 – Advanced Supporting Products in 2008

IBM Tivoli Service Management Center for System z – Products

IBM Tivoli Service Management Center for System z (SMCz)

Enabling customers to strategically harness their System z mainframe as their integrated, enterprise-wide hub for more efficient management of business and IT services
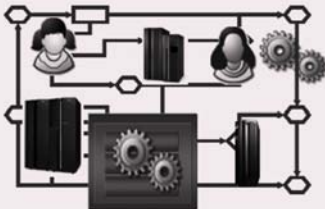
Best Practices & Services

Process Management

Service Management Platform

Operational Management

Optimized Infrastructure

IBM Tivoli Products Supporting SMCz Products

IBM Tivoli Service Request Manager	IBM Tivoli Change & Release Management	IBM Tivoli Business Continuity Process Manager	IBM Tivoli Business Service Manager
IBM Tivoli Application Discovery & Dependency Manager *(ITADDM)*		IBM Tivoli Change & Configuration Management Database *(ITCCMDB)*	IBM Tivoli Service Request Manager
IBM Tivoli Netview for z/OS, OMEGAMON, IBM Tivoli Composite Application Manager	IBM Tivoli System Automation, & IBM Tivoli Workload Automation	IBM Tivoli Usage and Accounting Manager	IBM Tivoli Identify Manager, IBM Tivoli Access Manager, & zSecure

Optimize The Data Center for All Platforms, All Processes

+ Not all listed products are yet available. All expected to ship GA on System z within 2008

Figure B2: IBM Tivoli Service Management Center for System z – Products View

Related 2008 Software Strategies In-depth Mainframe Research

1. **"Impressive IBM Tivoli Service Management Center for System z – Exploits z Strengths to Deliver Service Management Enterprise-wide."** Executive paper, published May 2008, 20 p.p. 6 charts & tables.

2. **"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.

3. **"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.

4. **"Mass Distributed Server Consolidation – System z Mainframe Linux-on-z/VM Extreme Virtualization far Outclasses Over-hyped x86/x64 Approaches."** White Paper, January 2008, 72 p.p., 27 charts & tables. A standalone Executive Summary of this major Paper is also available.

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.

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This new Executive 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/services vendors over a 25-year, prior IT industry career.

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